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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLII. No. 3005.] LONDON, DECEMBER 15, 1920. [72ND YEAR. PRICE 8d.

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VOL. CLII., No. 3005.] WEDNESDAY, DECEMBER 15, 1920. [72ND YEAR.

EDITORIAL NOTES.

Therm Accounts for Therm Consumers.

AMONG the changes in details which have to be considered in passing from the cubic feet to the therm basis of trading, is the form in which the consumers' accounts shall be rendered. Mr. W. W. Topley, the Secretary and Accountant of the Croydon Gas Company, in our "Correspondence" columns last week, invited readers to a consideration of the question; and it is one which, like the subject of therm price movements, is worth discussing. Mr. Topley supplies an illustration of what he considers is the best form in which to give effect to the "implied obligation" in the Act to charge for thermal units. Our correspondent does not put this form forward as being positively the one that should be applied. It expresses what he, upon deliberation from the secretarial and accountancy points of view, believes to be the best. In effect, our correspondent says to other secretaries and accountants: "What do you think of it?" "Is there anything better you can suggest?" Readers can therefore discuss the idea freely, and say what they think; and, even if criticism should be adverse, it will give no pain to Mr. Topley.

It is true the Act does not state that gas accounts shall show directly the number of therms charged for; but does anyone suppose that the designers of an Act proposing to impose a charge per therm ever thought it was necessary categorically to prohibit the accounts of consumers being made out in cubic feet at so much per therm, without mentioning the number of therms for which the charge is made? Imposing a charge in therms, and not in cubic feet, the consumer is entitled to know how many therms he is paying for without going to the trouble of making a calculation. Mr. Topley's form of account shows the index readings, and the quantity registered, the price per therm, and the total amount payable, together with a note indicating how many therms there are in 1000 c.ft.—in the example, "1000 c.ft. "of gas equals 4·7 therms the value declared by the Com- "pany—viz., 470 B.Th.U." To make this more explicit to the layman, we should like to see "at" after "therms" and "per cubic foot" after "B.Th.U." The consumer is not told what constitutes a therm. He can ascertain by calculation, if the note is clarified as suggested. He is not informed how many therms he has to pay for. This, too, he can find out by calculation. But is it fair the consumer should have to do this? Further, what a dreadfully hybrid thing it is to make out a charge for "7600 c.ft. at 1s. 1·6d. "per therm!" We should have every consumer who is not annoyed smiling at the solecism. The change having to be made, it is worth making properly. The sum of the account would be more intelligible, if between "cubic feet" and "at," the number of therms was inserted. By Mr. Topley's mode there would surely be some mystification of the consumer.

The suggestion is put forward by our correspondent on account of economy; but is this expedient? The Act abolishes cubic feet as a basis of trading, and only retains it as a basis of calculation of the therms to be charged for; and as the charge is at per therm, it is only logical that the number of therms charged for should be clearly stated on the account. It is a fundamental change from volume to quality—in the basis of charge; and to do what Mr. Topley suggests is to go only half way. We are hoping that as consumers are purchasing heat, they will be told plainly quarter by quarter how much heat they are paying for; and then they will be able to judge, irrespective of cubic feet or calorific value per cubic foot, how much heat they are using quarter by quarter. Supposing the first declared calorific value of the Croydon Gas Company is 470 B.Th.U., and the consumer is charged so many cubic feet at so much per therm. Supposing that next year the Company obtain sanction on economic grounds to declare 420 B.Th.U. as the value. The cubic feet used might then go up appreciably; and the consumer might be set wondering as to the cause of the increase, and feel some dissatisfaction. If the therms were stated in the account under whatever calorific powers or conditions of use, he would have a definite value for comparison. It will be wise to get the consumer to think in and speak of heat units, and to realize that he is purchasing and consuming heat units. There will be commercial value in educating him up to this, and satisfaction in the result. This will, we should imagine, have a value exceeding that of the economy sought by Mr. Topley in the accountancy department. But the educational work will not be accomplished by charging the consumers with so many cubic feet at so much per therm. Let us do the thing properly, by conducting the whole of the business in therms, even to the important detail of rendering the account with the therms used stated thereon.

Electricity on Gas-Works—Linking-up the Gas and Electricity Industries.

THE use of electricity on gas-works is growing, and will continue to grow, because the conditions of power requirement on such works are such that distributed energy from a central place of production on the works themselves is an economy and a convenience. There is an old, much-abused maxim as to there being a place for everything, and that everything should therefore be put in its place. There are places for gas, electric, and steam power; and they should be put into their rightful places where they can best serve economy, efficiency, and convenience. The true engineer is not guided by partiality or indurated notions, but by what will for the purpose in hand achieve the maximum result. Gas engineers have been broad-minded in this matter of electric power, and have shown a true engineering spirit, with the result that many works demonstrate as finely as can be found anywhere to-day the value of electricity where power is required for scattered plants, and incidentally the wisdom of having gas-driven generating sets on the works under the immediate control of the user, and without the dangers and losses inseparable from transmission from the larger local supply station at a distance. Gas engineers used to apply to their processes small-power gas and steam engines wherever required. Now a larger gas-engine at the generating plant on the works concentrates within itself all that was done by a number of smaller engines in the old days; and the dynamo, the cables, and the motors are but the means for distributing and applying the energy developed by the larger engine. A high load factor can be developed on gas-works. Economy results. But on a gas-works, gas, steam, and electricity all being available, the application of electric power should not be made at any point until there is assurance that the conditions are such that greater economy cannot be secured by using one of the other agents.

Through a paper, Mr. H. C. Widlake has been telling the Institution of Electrical Engineers of the many parts of isolated plant—travelling and stationary—to which electrical operation is now applied on a gas-works, which is good testimony to a strong engineering independence. This development does not help to strengthen in any way Mr. Widlake's point that in days past (and to a certain extent at the present time) there were gas engineers who treated this application as a great secret, and only admitted it in a

shamefaced, apologetic sort of way. There may have been some; but the childish were but the few. We have not met with them ourselves; we have only heard of them, and are not sure that there is not a good deal of fiction about the story. Anyway it was, if it existed, a foolish ostrich-like action; for electrical equipment cannot be obtained without going to the electrical plant makers, and electrical equipment makers have tongues the same as other people. Silence on the part of any gas engineers as to their own adoption under their own special and suitable conditions for electrical operation will not stop other people from utilizing electric power where the conditions are also of an apposite order, any more than the progress of the gas-engine can be stayed by the propagation of the fallacies of many electrical engineers as to modern gas-engine working. After all that has been electrically done in this direction, never was the output of gas-engines larger and in greater units than of late. This shows that the development of actual experience is very effective in crushing the verbal defamation of competitors. The electrical engineer is not incorporating gas-engines in his plant; they would in the greater stations want larger units than are at present made. But other engineers are adopting them for generating electricity for other industrial purposes—units of from 500 to 3000 H.P. having had quite luxuriant adoption of recent years. This is a development that is against the views as to the fitness of things held by electrical engineers; they would sooner see electrical energy tapped from the town mains.

The paper by Mr. Widlake does not evince much coyness on the part of the gas engineer as to what he has done electrically in his particular circumstances. It rather tends to show him as a man of action in taking what offers best to fit his process conditions. The author has vision. He thinks that the facts he gives in the paper must ultimately result in members of both the gas and electrical professions taking a broader and altogether more reasonable view of the entire subject of power competition. The small introduction of electrical power into gas-works when stoking machinery was first operated by it, was a source from which quite a broad stream has developed. This fact may, it is thought by Mr. Widlake, have an issue in one of two ways. It may lead in certain districts to gas-works being the sole place at which coal will be used on a large scale, and therefore the source from which electricity purveyors will draw the necessary fuel for the operation of their generating sets. Or it may lead to an extensive fusion of gas and electrical interests in connection with large-scale joint undertakings—"joint" not only as regards business control, but in the technical sense of the word for the supply of light, heat, and power to the general public. We are not at all inclined to think that the one or the other will be traceable as an issue from electrical operation on gas-works. Coal conservation may lead to the former development, combined with the merit of high boiler efficiency. From this we look confidently to a continuation of the developments that have taken place at Greenwich, Manchester, and other provincial places. The lowest recorded fuel costs are obtained at an electricity generating station with a load factor of only 25 p.ct. through the employment of coke breeze. As Mr. E. W. L. Nicol was recently telling us, results obtained at the Greenwich power station of the London County Council indicate that the patent "sandwich" system has effected a saving in fuel cost of about 16 p.ct. on all steam generated from a 50 p.ct. mixture of coke and coal breeze; and from the figures it is calculated that the average evaporation per pound of the mixed fuels is about 7¼ lbs., or over 70 p.ct. efficiency. At other power stations an evaporation of more than 9 lbs. has been recorded. That is the line of business fusion. The amalgamation of gas and electrical interests in connection with big-scale joint undertakings is not to-day so promising. It is now too late, unless something miraculous happens; for everything shapes towards concentrated generation in super-power stations, and the splitting of the electricity supply industry into two parts—generation under joint authorities, and vending by individual local authorities or companies. We cannot, of course, prophesy; conclusions can only be formed from the current trend of things.

Works Committees for Gas Undertakings.

THIS is a matter which the administrators and chief officials of every gas undertaking should consider who have not already a works committee established; for there is infinite advantage in such bodies, leading as they do to collaboration of a most beneficial order. The National Joint Industrial Council for the Gas Industry have drafted a model form of constitution for works committees for gas undertakings; and it has been circulated by the Federation of Gas Employers. The word "model" shows there is nothing obligatory about it, and that it is purely suggestive. But that it may be accepted is positive, seeing the source from which it emanates, and that it is founded on solid experience. It will also be observed that the powers of the works committees are strictly limited, inasmuch as they are purely advisory and consultative. This fact, however, is no real measure of the influence and advantage that issue from the co-operation that such bodies bring about. What is generated as a result is of a very valuable order in assisting in development, in reducing friction, and in promoting a good spirit and confidence. The formation and the operation of works committees do not constitute a new policy. Such committees have been part of the system of some gas undertakings now for a few years; and the testimony as to benefit is most encouraging. As was recently heard, too, at the autumn meeting of the Society of British Gas Industries, the plan has been introduced into, and enthusiastically adopted at, the works of manufacturers and contractors identified with the gas industry; and the same tale of satisfaction, and not in a single instance of regret, came from Mr. Fred West, Mr. Harold Davis, Mr. F. G. Cockey, Mr. Thomas Glover, and the President (Sir Arthur Duckham)—the last-named in connection with a chemical company of which he is a Director.

A great development in the launching of works committees has lately taken place. The war and its after-effects have made men in industry think deeper than they have ever thought before on certain topics that have always been, although insufficiently realized, as important to them as other topics to which they have given more interested consideration. They may never have been unsympathetic to their employees; and they may have been considerate employers within the limits of the rules as to pay and hours, which, however, were and are largely under the influence of the workers' own organizations. But there is something beyond. Machinery and other plant are part of a manufacturers' system; but the human element is the more important part. That human element has been to a large extent looked upon in some works as though it was a thing distinct from the complete organization, and so to be treated. New times, new ideas. The new idea in this case is the right one. A fresh spirit has to be created and stimulated by the workers being placed in a position which will make them feel and know that they are inalienably part of the concern which gives them employment, and that the maintenance of its fortunes is their business. We have heard this described as "sloppy sentiment." There are many employers who are now working in harmony and good co-operation with their employees who devoutly wish they had not been so long in adopting the teachings of this so-called "sloppy sentiment," which their experience allows them to describe as sane counsel and healthy practice. The gas industry is going through a period of transition. It is a case of having the interest of every man. Interest and efficiency are required from the delivery of the coal to the point of gas combustion, or the despatch of the secondary products. The improvement and amelioration of the conditions under which work is carried on are quite good matters for closer co-operation; but this is only one method among several in which interest and a new spirit may be generated and cultivated. Developments in collaboration spring into being almost unconsciously when the works committee has been started, and placed on a sound footing.

The workers in some industries see unemployment enlarging all about them. This more than anything shows them how much they are concerned in the fortunes of the concerns which employ them; and it is to their interest to do all within their power to maintain these concerns in a state of prosperity. In some instances, they have been ill-advised, and have followed the path of excess in regard to pay and reduced hours and output. Their excesses have helped to deprive the factory and business of some of its elasticity, and so have reduced the limits of opportunity. The works committee, besides the advisory and consultative work, can be made the channel through which light and knowledge can be disseminated, and better understandings will be the result. This is the experience of many employers who have tried such committees, and have fostered them in the right spirit.

Industrial Furnace Efficiency and Progress.

THERE has been a copious supply of literature of late dealing with the progress of gas-heated industrial furnaces—progress in the development of the furnaces themselves, and in their application to work. The literature has taken the forms of papers, addresses, articles, and correspondence; and this is a satisfactory condition of things, as it all goes to show that the industrial field is being attacked with the vigour it deserves. Industry reaps the chief advantage; and the furnace makers and the gas suppliers share in the rewards of growing popularity. There are several designers of furnaces, and not all of them are manufacturers. We have no personal interest in who are the designers, or who are the makers. Our interest lies in the direction of the furnaces that show the highest efficiency in, and economy for, any particular class of work. This, too, is the interest of the user and of the gas supplier; and therefore readers of papers that are intended to bring before the industrial world the many virtues of gas-heated furnaces (when the readers are identified with gas undertakings) should not confine themselves to those furnaces with which they have had experience, or in which they have personal interest, but references and data should be included to show what progress is claimed (when progress is authoritatively confirmed) in other directions.

In our "Correspondence" columns to day, Mr. Cyril G. Davis calls attention to two of the papers read at the recent annual conference of the British Commercial Gas Association; and in effect his letter is a complaint that the readers of the papers—Mr. E. T. Musgrove and Dr. C. M. Walter—did not specifically allude, by the quoting of actual data, to the latest furnace progress that has been effected by his firm after painstaking experimental work. This may apply to Mr. Musgrove's contribution; but we see that Dr. Walter, in the paper as printed by the "B.C.G.A.," and incidentally in the abstract that was published by us, did mention the work of the firm, and stated that "with regard to recuperator "furnaces of the 'Revergen' type, the results so far ob- "tained show very marked advances over anything previ- "ously obtained in applications where high temperatures "are required, and large masses have to be heat-treated "as a continuous process." That is an acknowledgment; and, of course, it would be impossible for authors of papers, without making them of inordinate length, to cite complete data for every form of work, and for every type of furnace applicable to that work. At the same time, it is to the interests of gas suppliers that the most advanced efficiency that has been realized should receive the utmost publicity in industrial circles—no matter who the firm or person achieving the progress. Mr. Davis does not claim that his firm is the only "pebble on the beach" in the matter of progress; but whether it is his firm or any other that has developed to higher efficiencies than the furnaces quoted in papers or addresses, it would be to the common advantage that the advances should be plainly noted.

There is another matter, touching both propaganda and development. It seems there are gas undertakings that have adopted an attitude of supineness towards industrial heating. Dr. Walter urged that collaboration between furnace makers and gas suppliers is essential—"essential," be it noted—for the extension of industrial heating. Mr. Davis is in agreement with him; but he says the makers have been unfortunate in this respect. Some gas undertakings are eager to collaborate, others show aloofness; while others again exhibit an absolute indifference to the development of industrial heating. We are sorry for the two latter classes. These are not the days for indifference; these are days when there should be a genuine pulling together by all parts of the gas industry with the object of building up for the attainment and maintenance of future maximum success. Were it not for what the furnace makers have done in gaining the interest of the engineering and other manufacturing industries, in some areas where the fields open to business exist, the industrial heating load would have been of very meagre proportions. The gas undertakings concerned have nothing for which to be thanked in respect of the cultivation of this load; they have, on the other hand, something to be thankful for to the furnace makers and to those gas undertakings in other areas that have been energetic in this direction. The experiences of the latter have been most valuable to manufacturers in the areas of those gas suppliers who have not sufficient energy in them to move outside the orbits of quite ancient adoption.

Principles and Expediency.

SOME people are such sticklers for observing principles that they appear to be incapable of exploring matters to ascertain whether there are not occasions when expediency should override their principles. The Government Dye Stuffs (Import Regulation) Bill supplies a case in point. The Bill is making rapid progress. Its objects are well known. It is to prevent for a decade the importation of dyes, colours, intermediates, and so forth without licences issued by a Committee composed of makers and users and independent men. The ten years will give the dye industry in this country time to establish itself firmly; and that is something worth getting for both commercial and protective reasons. The interest of the gas-supply industry in the measure is that the development of the dye industry in this country must have the natural issue of contributing to the development in some degree of the industries from which the materials are drawn for the making of dyes and colouring stuffs. If we look at tar prices to-day, in them will be seen every reason why every home industry that makes demand for tar or its derivatives, so assisting in maintaining its position, should have our best wishes for progressive success. When the Bill was under discussion on the motion for its second reading in the House of Commons, the debate ran riot between expediency and principles. Expediency won. But the anti-protectionists of the more fervid type saw their dearly cherished principles were being violated; and they could not distinguish the differences, or they had not done so, between protecting an industry for the economic advantage and safety of the country, and the institution of a system of protective tariffs. And they were blind to the fact, though the best of reasons were put before them, that this was an instance where expediency should rise superior to political principles. It is not purely a trade matter. It is a question of safeguarding for all time, by temporary regulation of competition, large commercial interests and employment, and being ready with the means of turning out large quantities of explosives in the time of war.

It is clearly a national obligation as well as a matter of prudence to see that these things are done; and they can be done if the dye industry is given time, without oppression from German sources, for maturation both technically and commercially. So large was our reliance on Germany for dyes that, on the declaration of war, the textile industries were speedily reduced to a state of extreme poverty for the materials with which to finish their products, and unemployment of a large order resulted; and the very materials and plants which Germany had developed for commercially enriching themselves in times of peace gave that country an advantage in the time of war for turning-out explosives in bulk. Our own backwardness was their gain. These were lessons that should not be forgotten, and from them remedy should spring. But there are political principles which are sacrosanct in some people's eyes, and for their preservation in all circumstances even national interests and national safety ought, it seems, to be sacrificed. Those whose minds are so conditioned are fortunately in the minority in the House; and so the Bill goes forward. At one time there were gas administrators who clung tenaciously to a flat-rate for gas whatever the purpose for which it was used. They have had to give way to the pressure of competition. Differential prices with many undertakings constitutes a practice of long standing; and now in Gas Bills one frequently sees clauses to authorize differential charges. Expediency must have its place in the planning of our ways.

National Gas Council.

The National Gas Council are holding their second annual meeting to-day; and the President (Mr. D. Milne Watson) will have a good tale to tell of the important work, and mass of work, which has engaged the constant care of the Council during this momentous year. The verdict of those present at the meeting, we are sure, will be "Well done." The work could not have been got through without conscientious regard for duty and self-sacrifice on the part of all at the head, as well as of the excellent personal organization that the Council have brought together. The report of the Council is published in this issue; and among its many gratifying features is the one that the Council now represents 88·3 p.ct. of the total make of gas in the entire kingdom. We hope to see the other 11·7 p.ct. come to the determination to do

their part in completing the 100 p.ct. The 88·3 p.ct. speaks of a splendid unity.

Cooker Standardization.

The question of the standardization of gas-consuming appliances is being pushed forward. Some makers with their own specialities have got far along the road of standardization. There are, however, experts in this connection who privately express the opinion that they do not see that any great advantage in respect of cost over and above what is obtained from present patterns is coming out of the work that is being done. Our hope is that they are mistaken. While there is this movement going on among those who make, those who buy are (through the National Gas Council) seeing what can be done in regard to the work of standardizing cookers. Now a Sub-Committee of the Committee originally appointed to consider this question are discussing the terms of standard specifications. Of course, constructional and maintenance costs, together with the greatest economy to the consumers, will be among the objectives sought. If anyone has any suggestions to make which would be helpful, we have no doubt the Committee would be glad to hear of them before they get too advanced with their work.

Legislation and the Rates.

A Select Committee of the House of Commons are now sitting, charged with the duty of endeavouring to find out what procedure the House could adopt in order that it may be informed of the effect which legislative proposals may have on the rates. The gas industry devoutly wishes that the Committee would suggest to the Government that in future there should be insistence on local authority electricity undertakings being conducted in a business-like way so that there is no charge on the rates. It comes rather hard on gas undertakings that they should through the rates have to make good some of the losses incurred by electricity concerns through charges being made insufficient to cover the expenses of providing the service. A stop should also be put to the bad practice in other places of charging for the services rendered by such trading undertakings a sum in excess of requirements for working and capital in order to obtain money to expend on purposes which should be charged to the rates. This is a form of indirect taxation which has no possible justification.

National Economy and Electricity Schemes.

The Government are yielding to the pressure that is being brought upon them from all sides to retrench, and to prohibit all expenditure that can be conveniently postponed until the country's financial conditions are less stressful and more settled. In the House last week the Chancellor of the Exchequer announced the plans of the Cabinet for reducing expenditure. The very first item states that the Cabinet, having regard to the exceptionally heavy taxation which is the inevitable consequence of the war the high cost of material, the trade reaction that has set in, and the emergency measures required to mitigate the hardships of unemployment, consider that to the extent of reforms involving further burdens upon the Exchequer or the rates, the time is not opportune for initiating them or putting them into operation. It is an instruction, therefore, to all spending departments that except with fresh Cabinet authority, schemes involving expenditure not yet in operation are to remain in abeyance. This general principle applies to all spending departments; but exception must be made for such temporary measures as are necessary to deal with the special problem of the unemployed. What of the large electricity power reorganizing schemes? And what, too, of the Severn barrage and electric power scheme? We think the electricity supply industry may consider themselves safe now from having the burden of the latter thrust upon it; and as to the former, it is pretty clear that it is not much good continuing to squeeze the Government in the hope of getting the preferential loans that were withdrawn from the Electricity Supply Bill a year ago and restored in the Bill introduced this session, but which measure is now well dust-covered.

Unemployment Insurance.

It is understood that those gas undertakings that require certificates of exception under the Unemployment Insurance Act can have them if they have a contract to continue in their service the employees concerned until such time as they will be entitled to a pension or other retiring allowance under a superannuation scheme, or otherwise there must be a contract to find employment for life. These are rather onerous terms. Perhaps it ought not to be said they are amusing; but it is safe to say they are unsatisfactory. Further discussion may modify them. But we think that, generally speaking, gas undertakings are rather inclined not to take steps to obtain such certificates—at any rate, it is pretty safe to say they will not do so on these conditions.

Gratifying Coal Output.

Another gratifying output of coal has been recorded for the week ending Nov. 27. It amounted to 5,176,500 tons. This was not quite so good as the week preceding, when the amount was 5,210,700 tons. Relatively small fluctuations must be expected; but there is something for which to be thankful in obtaining a substantial advance on the returns to which we have all too long become accustomed. Directions have been issued by the Board of Trade as to the payment from Nov. 4 of the increased wages of 2s. per day to workers over 18 years of age, 1s. to those of 16 and 17 years of age, and 9d. to those below 16 years.

PERSONAL.

Mr. M. E. NICKLIN, of Rother House, Summer Lane, Wombwell, near Barnsley, has succeeded Mr. T. B. Smith as Hon. Secretary of the Midland Section of the Coke-Oven Managers' Association.

It is stated that Mr. RICHARD ASHWORTH, Assistant Manager of the Lichfield Gas-Works, whose appointment as Manager to the Wirksworth Gas Company was announced last week, has since declined the position. The Directors of the Wirksworth Gas Company have now selected Mr. EDWARD MOORE, of Shepton Mallet.

OBITUARY.

WILLIAM ARTHUR HAWARD, M.Sc.

WILLIAM ARTHUR HAWARD, who accidentally met his death on Monday, Dec. 6, while making some final experiments in an important investigation upon gaseous combustion under high initial pressures, upon which he had been engaged during the past two years as a Salters' Research Fellow in the Imperial College of Science and Technology, was passionately devoted to the cause of scientific research. There is every reason to believe that, had his career not been thus so tragically cut short, he would at no distant date have achieved great distinction as a scientific discoverer. Even during the research which he was completing at the time of his death he had, by most skilful experimental work, discovered a series of facts which pointed to an important new fundamental development in the science of combustion. Indeed, the actual experiment upon which he was engaged when the accident occurred was intended to test a new theory which had been suggested to account for some of his remarkable experimental results. In due course, when the results of his research are published, the importance of them to science will at once be apparent. He undoubtedly laid down his life in the cause of science.

The various stages in his all too brief, but very distinguished, career, were as follows: Entering the Royal College of Science in October, 1912, he took the Associateship two years later, and his London B.Sc. degree with first-class honours in chemistry. He thereupon commenced a course of post-graduate study and research in the Department of Chemical Technology, under the direction of Prof. William A. Bone. It was very soon apparent that he was unusually gifted as an experimentalist; for he made some remarkable experiments upon certain aspects of surface combustion, which have yet to be published. During two of his summer vacations, in the years 1915 and 1916, he carried out many investigations, under the direction of Dr. R. V. Wheeler, at the Eskmeals Home Office Experimental Station upon: (1) The propagation of flame in mixtures of hydrogen and air, and (2) the uniform movement of flame in mixtures of acetylene and air, the results of which were embodied in two papers that were published in the joint names of himself and two others (who had assisted him) in the "Transactions of the Chemical Society" for 1916 and 1917. In June, 1916, he was elected to a Beit Research Fellowship, tenable at the Imperial College; but this was relinquished some six months later in order to join the chemical staff of H.M. Explosives Factory, at Gretna, where he remained until shortly after the armistice. He then obtained a Salters' Research Fellowship, with which, at his own desire, he undertook the particular investigation which he was completing at the time of his death. Though a man of gentle disposition, and very modest in his demeanour, he undoubtedly was conscious of his experimental powers, which excited the daily admiration of those whose privilege it was to watch their rapid development. He had in a marked degree the instinct of the true artist, which was never satisfied with

anything less than the best. He was twenty-six years old, and was married only fifteen months ago.

The circumstances of the accident which so tragically ended his career were, so far as it can be ascertained, as follows: On Monday, Dec. 6, in the course of his researches, he essayed to explode in a nickel steel bomb (whose test pressure was 1000 atmospheres), at an initial pressure of 50 atmospheres, a mixture of two volumes of carbonic oxide and five volumes of oxygen. By analogy with other similar experiments made during the research, the final pressure developed during the explosion would not exceed 450 atmospheres. The object was to obtain a photographic record by a well-known method, in which Mr. Haward was exceptionally expert, of the rising pressure that occurred after the mixture had been exploded. He had performed similar experiments continuously over a period of two years. He was a thorough master of the experimental procedure, and perfectly understood all the precautions to be taken. He was temperamentally well fitted for such work, as he acted at all times with great deliberation and the utmost self-possession. It was his custom, in order not to be distracted during the final stages of the operation, to lock from the inside the door of the room in which it was performed. This room is what is known as a "dark room." It had a floor of concrete; its walls and ceilings were painted black; and there was a dark blind which would be pulled down before the final stage was reached. The room was well ventilated with a fan (which was working at the time of the accident); and it was electrically well lighted. At the moment when the mixture was fired, it was customary to switch off the ordinary electric light; but the beam from an arc light in the photographic part of the apparatus would still afford a certain amount of diffused light, so that at no time during the experiment would the room be in total darkness. The deceased had evidently successfully reached the penultimate stage of his operations at about 4.30 p.m. A quarter of an hour later a sharp report (not a violent explosion) was heard by people working in adjacent rooms. Prof. Bone at once knocked at the door of the experimental room, but received no answer. Thereupon the door was burst open, and the deceased was found on the concrete floor bleeding profusely from a wound in the neck. First-aid was promptly administered, medical assistance was called, and an ambulance summoned, in which he was conveyed to the St. George's Hospital, where he died a few hours later.

Subsequent investigation of the room in which the experiment was made showed that there had been no explosion of sufficient violence to cause a concussion wave. Delicate glass apparatus standing in the room was found to be intact. There was nothing wrong either with the explosion bomb itself or with the recording apparatus; but there was evidence of flame having got past the valve of the explosion vessel, which may have been closed down "gas-tight" but not necessarily "explosion tight" before the mixture had been fired. The cause of death was the shattering of a Bourdon gauge by a small secondary explosion—the dial of the gauge had hit the deceased full in the neck, and inflicted a deep wound. The whole apparatus, including the explosion vessel and its valves, was known to have been in first-class order at the time of the experiment. The explosion vessel had been recently overhauled by its makers, and only a fortnight before the accident the valve of the apparatus had been re-ground in its seating in the workshop of the department. The deceased evidently had omitted to disconnect the Bourdon (as he usually did) before exploding the mixture and to sweep out all explosive gas in it. The cause of these omissions can never be positively ascertained; it can only be surmised that something had distracted the deceased's attention during the final stages of the experiment, which possibly caused him a few minutes afterwards to fire the mixture, forgetting that he had left the valve of the explosion apparatus not quite "explosion tight," and that he had not disconnected the Bourdon gauge. In any case, his death was the result of a pure accident, and at the subsequent coroner's inquest, a verdict of "death by misadventure" was recorded.

We regret to announce the death, on the 1st inst. of Mr. C. TODHUNTER, of Belfast, who was for some years Gas Manager at Ballymena, Ireland. He relinquished this position to become Irish representative for the G. J. Eveson Coal and Coke Company, Ltd., of Birmingham, with whom he was connected for 20 years.

The death occurred on the 2nd inst. of Mr. J. C. IM THURN, of East India Avenue, E.C., who was long connected with many South American undertakings—including the Primitiva Gas Company of Buenos Ayres, the Bahia Blanca Gas Company, and the South Barracas (Buenos Ayres) Gas and Coke Company. He was 74 years of age.

Modern Developments in Coal Gas.—In Table II. [p. 576], accompanying the paper on "Modern Developments in the Manufacture and Utilization of Coal Gas," by Messrs. Fred. J. West and T. A. Tomlinson, there is an error which, though obvious, may be misleading. The weight of air for the complete combustion of 1 lb. of carbon monoxide should be 2·46. The figure for hydrogen, 34·42, was repeated by mistake.

The will has been proved of Mr. Robert Ormiston Paterson, of Weston-super-Mare, formerly Engineer and General Manager of the Cheltenham Gas Company. He left estate of the gross value of £10,468, with net personalty £9336.

NATIONAL GAS COUNCIL.

Second Annual Report.

THE following report will be submitted at the second annual general meeting of the National Gas Council of Great Britain and Ireland, which is to be held this afternoon, under the presidency of Mr. D. Milne Watson.

Gas Regulation Act.—The year has been fully occupied with the question of Financial Hardships of Gas Undertakings, which resulted in the passing of the Gas Regulation Act, 1920. Starting with the promise of the Board of Trade in October, 1919, to introduce a Bill based upon the recommendations of the Fuel Research Board, the progress made has been recorded month by month in the Council's reports. The Gas Regulation Act, it is felt, will provide a new charter for the industry, and will be the means of restoring the confidence of the investing public and establishing the gas industry upon a footing more commensurate with its importance.

Among other Bills which received the close attention of the Council on behalf of the industry in general may be mentioned the following:

The Public Utility Companies (Capital Issues) Act, 1920.—This is the second Bill referred to in the letter from the Board of Trade dated the 8th of October, 1919, in reply to the Council's representations regarding the grave financial position of the industry. The Act extends the borrowing powers of gas undertakings.

Amendments were introduced at the various stages of the Bill on behalf of the Council in the interests of the industry.

Finance Act, 1920. — Corporation Profits Tax. — Through the Council's efforts, statutory gas undertakings, both maximum dividend companies and sliding-scale undertakings, have been exempted from the Corporation Profits Tax until the end of 1922.

Great Northern Railway Act, 1920. — As originally proposed, clause 47 of the Great Northern Railway Bill gave power to the Railway Company to take supplies of gas, water, and electrical energy from any undertaking supplying these to the Railway Company, and to distribute it along the line of their railway to any point.

The Council was successful in obtaining the omission of all reference to gas and electricity undertakings.

Coal.—The Council has had constantly in view the all-important subject of coal; and its efforts to obtain supplies for gas undertakings during the summer months prevented many works from being compelled to close down altogether, owing to shortage of stocks, during the coal strike.

The Council has appointed a Coal Advisory Committee, which is in close touch with the Midland Co-Ordinating Committee (representing all the District Coal and Coke Supplies Committees), and a distinct improvement with regard to coal supplies has been effected in many instances.

With regard to factorage, the Council was informed that after September, 1920, no factors would be allowed to intervene between consumers and collieries, beyond those already existing.

The question of short weight is also receiving attention; and it is hoped to effect an improvement shortly.

The Council's assistance was asked by the Board of Trade in connection with the Coal (Pit's Mouth) Prices Order and Direction, 1919; and several rulings were obtained for the gas industry with regard to this Order, where differences of opinion arose.

Coke.—With regard to the difficulty of obtaining export licences for coke, the Council has frequently presented the case for gas undertakings to the authorities. Although several individual cases have been dealt with successfully, the Council regrets that it has been unable to obtain the same concession with regard to a large number of other undertakings.

Stoves.—The Committee appointed by the Council to investigate the question of standardization, after carefully examining the completed questionnaires received from the various districts, decided that a small number of patterns of cooking stoves would meet the requirements of the industry, and has asked a small committee to draw up one or two "standard" specifications to meet the needs of different areas. Considerable progress has been made.

Meters.—Through its representatives on the Joint Committee with the Society of British Gas Industries, the Council came to an agreement with the meter makers with regard to postponing advances in the price of meters and limiting the application of such advances.

Profiteering.—The Council was represented at a hearing of the Profiteering Committee appointed by the Board of Trade; and the evidence submitted by the Council's representative proved beyond a doubt, and to the entire satisfaction of the Profiteering Committee, that no suspicion of profiteering could rest upon the gas industry.

Tar.—The Council is glad to report that several districts have adopted a scheme with regard to the sale of tar, akin to that previously put forward by the Council; and it is hoped that the other districts will follow their lead.

Spent Oxide.—The Spent Oxide Committee appointed by the Council to investigate this question has reported that either the cost of sulphuric acid must be reduced or the acid makers must give gas undertakings a better price for their spent oxide. Investigations are still proceeding into the cost of sulphuric acid manufacture; and members of the Council will be kept in close touch with the results.

Benzole.—The costs of washing gas for benzole have been carefully investigated, in view of the dearth of motor spirit and the prices now being obtained for benzole. Further inquiry is proceeding as to the costs in the case of both existing and new plant.

Income-Tax.—The Council has had a large number of inquiries with regard to assessment rates, and has advised undertakings that the authorities are prepared to extend the increased depreciation allowance for a further twelve months. This, however, is left to the discretion of the local Inspectors of Taxes.

Workmen's Compensation (Employers' Liability Insurance).—This matter has been dealt with during the year; but owing to pressure of

work consequent on other important matters, the formulation of a definite scheme is held over until the coming year.

Joint Subscription.—It has been agreed that, in place of the existing separate subscriptions to the National Gas Council and the British Commercial Gas Association, there shall in future be one subscription only, to cover the requirements of these two bodies and to include a sum to be handed over to the Institution of Gas Engineers for research work.

District Executive Boards.—A tribute must be paid to the loyal co-operation which the Council has received from its District Secretaries, particularly in connection with the Gas Regulation Act, which entailed an amount of heavy work and personal supervision. It is owing to the smooth working between the districts and the headquarters staff that so little difficulty has been experienced in establishing a common line of action for the industry in many important matters.

Federation of British Industries.—The Council has felt it desirable to keep in touch with the reconstruction and other work undertaken by kindred industries; and during the past year the Federation of British Industries has proved extremely useful in this respect.

British Commonwealth Union.—The Council has also joined the British Commonwealth Union, and wishes to record its appreciation of the invaluable services rendered by this body in connection with parliamentary matters.

Income.—The income for the financial year ending the 30th of September, 1920, contributed at the rate of 1s. per million c.ft. of gas made by undertakings, amounted to £11,208 8s. 9d.

Expenditure.—The expenditure of the Council for the past year amounted to £13,023 19s. 3d., which, allowing for the balance of £286 15s. 6d. brought forward on the 1st of October, 1919, leaves a deficiency of £1528 15s. These amounts exclude the sum of £1620 17s. 2d., the expenses incurred in connection with the publicity fund raised on behalf of the Gas Regulation Act. Of the sum of £2000, which was reserved for the purchase of suitable furniture for the Council's offices at No. 30, Grosvenor Gardens, £1000 has been disbursed during the past year. The sum of £1000, set aside towards the expenses connected with acquiring the premises in question is still in reserve.

General.—The work of the headquarters staff continues to increase in volume. A great number of inquiries were received with regard to the Gas Regulation Act and upwards of 70,000 letters were dispatched during the year.

The following table gives an indication of the influence of the Council throughout the country:

District.	Number of Undertakings Joined.		Percentage of Total Make of Gas in Each District.	
	Company.	Municipality.	Company.	Municipality.
Eastern	43	3	82·3	57·6
Manchester	49	53	97·0	97·3
Yorkshire (West Riding)	32	23	95·2	93·0
Midland	69	27	87·4	97·1
Northern	33	10	93·5	84·0
Southern	112	5	89·5	46·0
London	8	—	78·0	—
South-Western	64	8	93·6	89·2
Ireland	23	6	68·8	87·6
Scotland	45	34	61·0	95·2
South Wales	28	16	89·7	94·9
Entire kingdom	506	185	85·0	94·5

Percentage of the total make of gas in entire kingdom represented by the Council . . . . . 88·3.

THE GAS INDUSTRY AND WORKS JOINT COMMITTEES.

Model Constitution Drawn Up.

AT a meeting of the National Joint Industrial Council for the Gas Industry, held on Sept. 23, the Executive Committee were given plenary powers to draft a constitution for Works Joint Committees; and the following model form has since been agreed upon. The constitution being a model only, it is, of course, not incumbent upon any undertaking to adopt it. Having regard, however, to the undoubted success which has attended the formation of Works Committees in the past, not only in the gas industry but in other industries, members are recommended by the Federation of Gas Employers to give a fair trial to the adoption of Works Committees. The constitution set out here may be modified to suit individual circumstances; but it is suggested that if the model be adhered to as nearly as possible, disputes may be avoided.

Functions.

The functions of the committee shall be advisory or consultative, and shall cover the following matters—viz.:

1.—To consider any matters referred to them by the..... Regional Council.

2.—To consider any matters tending to create and stimulate a wider interest in the efficiency and output of the undertaking, or to improve and ameliorate the conditions under which the work is carried on.

3.—To inquire into any matters causing friction or difference which may arise, and the best means of settling them.

4.—To consider any questions arising as to the interpretation of awards, orders, and circulars.

5.—To consider questions relating to the health and safety of the workpeople.

6.—To consider facilities for the encouragement and utilization of inventions and improvements, with due regard to the rights and interests of the author or designer thereof.

7.—To consider and investigate matters and circumstances which tend to reduce efficiency or output or to interfere with the satisfactory working of the undertaking.

8.—To consider generally any matters affecting the well-being or improvement of the undertaking or of the workpeople, and whether educational, technical, social, or otherwise beneficial.

Constitution.

(*a*) Each works committee shall consist of representatives of the workers selected from each department, group of departments, works or undertakings, and of representatives of the management.

(*b*) All of such representatives must be employees of the gas undertaking.

(*c*) The number of representatives for each committee shall be agreed between the management and the workpeople.

(*d*) The workpeople's representatives shall be, as nearly as may be practicable, proportionate to the various departments. The various departments shall nominate candidates who shall be elected by the workpeople as a whole, unless a majority of the workers decide otherwise. Nomination papers shall be received by the gas undertakings and ballot papers issued by them.

(*e*) The representatives of the management on the committee shall be appointed by the board of directors or gas committee.

(*f*) All workpeople who have been continuously employed by the undertaking during the previous twelve months and are over 21 years of age shall be eligible for election.

(*g*) All workpeople who have been continuously employed by the undertaking during the previous six months and are over 21 years of age shall be qualified to vote.

Retirement, Reappointment, Re-Election.

(*a*) The period for which members shall hold office shall be twelve months, ending on June 30 in each year; and they shall be eligible for re-election.

(*b*) Casual vacancies may be filled by appointment from the side upon which such vacancies occur, the person so appointed holding office until June 30 next following.

Officers.

The officers shall consist of a chairman (who shall be a representative of the management) and either one or, if thought desirable, two secretaries (one appointed by the management and the other by the workpeople's representatives on the committee). In the absence of the chairman, the senior representative of the management then present shall preside.

Procedure.

The committee shall meet at such regular intervals as each committee may decide; but special meetings shall be held when necessary on the application of the representatives of either side, which shall state the special object for which the meeting is to be held. The agenda of business to be transacted at each meeting, together with the notice convening the meeting, shall be submitted by the secretaries to each member of the committee at least forty-eight hours before the meeting, except in the case of special meetings, which may be summoned informally by verbal notice to the members. Any matter which it is desired to bring forward for discussion at the regular meeting shall be notified to the secretaries at least four days before the date of the meeting.

The voting shall be by show of hands. No resolutions shall be regarded as carried and no decision shall be deemed to be arrived at unless such resolution or decision has been carried or agreed to by all members present on each side of the committee.

The presence of one-third of the members from each side of the committee shall be necessary to form a quorum.

The works committee shall conform to any decisions of its Regional Council of the National Joint Industrial Council for the Gas Industry as to the functions and work which may be properly undertaken by the works committee.

Expenses and Finance.

No deduction shall be made from the employees' earnings for time actually lost in attending any meeting of the committee.

The undertaking shall provide the necessary accommodation, books, and stationary to enable the committee to transact business.

Coke Quenching Water.

In the report of the Committee of the American Gas Association on the disposal of gas-plant wastes, which was presented by the Chairman (Mr. L. J. Willien), it was remarked that at all gas plants where coke is produced, water is required for quenching the hot coke. The amount of water which escapes is generally not large; but there may be some excess, and this may carry with it sufficient fine coke in suspension and dissolved impurities to render it unfit to discharge to a stream. The suspended coke can be readily deposited in settling tanks, and the remaining liquid pumped back for re-use. The settling tanks should be large enough to hold at least four hours' maximum flow, and should be in duplicate to allow of cleaning. Where clean water only is used for quenching, the effluent from the settling tanks can be entirely freed from suspended matters and tarry particles by being strained through a fine bed of coke or a filter of wood shavings, and may then be used for any other purpose around the plant, or may even be discharged to a stream without detriment. But this process consumes large quantities of water—a ton of water per ton of coke quenched.

ELECTRICITY SUPPLY MEMORANDA.

THE Ministry of Transport have issued to the Press supplementary information (of what they call a technical nature) regarding the Severn barrage and electrical power scheme; but it does not carry us much farther than the original document, with all its beautiful flowery embellishments. Supposition, speculation, and vagueness are the striking features of the particulars sent out, though what is to be found behind the doors of the Ministry of Transport may be something of a much more definite character. Of course, power in a tidal river can only be obtained intermittently according to the state of the tide; and while the turbines are at work, the conditions of the tide would be constantly varying in wide degree. The first difficulty to be overcome would be to adapt the electric generators to the varying speeds of the turbines. It is proposed that mixed-flow turbines should be adopted, with direct-current dynamos. Control would be applied which would prevent the turbines from rotating at a speed greater than the theoretically correct speed for the maximum output under the particular head of water which happened to prevail at the moment in question. The voltage would be 525; and the average output of each dynamo would be approximately 1300 KW. The direct current would be passed into rotary converters of large capacity, which would produce alternating current at 330 volts. Their static transformers would then transform the current from 330 to 60,000 volts—the tension at which it is proposed to transmit the energy. Another point is that, whereas the amount of energy to be derived from the tides in the Severn averages week in week out about ½ million horse power per day, it would be proposed to instal machinery at the storage reservoir (mentioned last week) to give a maximum or peak output of approximately 1 million horse power. The principal outlets for the disposal of energy are four. The first has to be created by industries planting themselves on the banks of the Severn. The second is the industrial area of South Wales. The third outlet is the Midlands. The fourth is constituted of the Thames Valley and London. London is situated at a distance of 115 miles from where the barrage would be located; and it is thought that it might be possible in this instance to transmit the energy at 120,000 volts. The cost of a transmission line to London capable of conveying half-a-million kilowatts, with 10 p.ct. loss in the line, would be approximately 1½ millions sterling. It is thought that the proper use for the electrical energy from the Severn would be to take up the peak load in industrial areas. This being so, the embryo Joint Authorities need not anticipate that the Severn scheme means an early death. In fact, the designers of the scheme suggest that it could be made to work largely in conjunction with steam-generating stations in such a way as to enable the latter to work with a load factor of from 70 to 80 p.ct., instead of from 20 to 50 p.ct. as at present. We suppose more will leak-out about the scheme later on; but at present the side-lights only present us with something of highly amorphous character.

The Severn Scheme.

In their first comments on the scheme, the electrical papers have not taken it very seriously. It would have been surprising had they done so. They do not approve of the undignified form in which the Ministry launched it. A big engineering venture deserves an introduction in a style better than that of a popular newspaper. The "Electrical Times" describes the performance as "cheap literature;" and "stuff" is another qualitative expression employed. It is over finance that in all cases there is considerable perplexity. It has been stated in one or two quarters that the scheme—at the source, and not including distribution—would cost some 30 millions sterling; and there is generous optimism on the part of the Ministry's experts that current would be generated at a little over ½d. per unit. What our friends are anxious to know is what part of the enormous capital cost would be allocated to the power part of the scheme, and what is included in the ½d. (or rather more) per unit generated. The "Electrical Times" takes the working at the largest and best station at Manchester, and finds that the cost per unit works out to 1·45d., or deducting fuel to 0·97d. There we have fuel costing only 0·49d. per unit; and the other charges running up to close upon 1d. The power from the water of the Severn is not going to be obtained in exactly an economical way, in view of the supplementary power-compensating force to be provided by the huge lake of sea water that is proposed to be constructed, with all its pumping and electric power plant equipment. "Electrical Industries" waxes sarcastic. It points out that when the demand for national economy is growing louder and louder every day, when every penny of available money is marked for urgent work, the Ministry launches a puff prospectus of a scheme involving millions of pounds, and presenting more speculative factors than any other electrical proposal before the country. The "Electrician" very much doubts the electrical expediency at present. Looking at the existing cost of coal, and the necessity for husbanding our stores of coal, cause the "Electrical Review" to regard the scheme more favourably than it would otherwise do; but even such considerations do not prevent it regarding the matter electrically, and so, Pooh-Bah like, it says as to the unit cost it is unwise to be too sanguine especially in the prediction of cheap electricity. "Engineering" came down with heavy weight upon a scheme launched by a Government Department in a manner which might have been expected in a prospectus of a not reputable company-promoting venture; and it winds-up with a view which fits our comments of last week. "It will be clear," remarks our contemporary, "from the labour cost, the multiplicity of units at the dam and duplication of the plant at the pumping-station, the cost of tunnelling, &c., to say nothing of the dam itself, and the separate railway and road viaduct with the locks and lock machinery, that the scheme would run the nation into vast expenditure to attain results which are by no means certain to secure a profitable selling price for the current generated."

Criticism.

There have been several indications of late that the electricity industry would dearly like to have the financial help that was proposed in the Electricity Amendment Bill which was pushed aside in the session now nearing its end; but they are not at all anxious for the Joint Board proposals and the compulsory purchase powers. We are on the side of those who are strongly opposed to the Government using national funds for industrial purposes, or giving to one statutory industry preferential financial facilities that are not accorded to other statutory industries. The electricity industry must see to it that in trying to secure the financial consideration which the Government included in the original Bill in 1919, and which consideration was so severely criticized and opposed in the House of Lords, it does not get imposed on it the compulsory clauses which it does not want, and which it regards as so objectionable. We doubt whether, in these times when the public are clamouring for retrenchment, and when the so-called "wastrels" in Parliament are being pilloried in the public Press, the Government will care to face a fresh financial commitment which expert financiers have condemned. We see that recently Sir F. Hall asked Sir Eric Geddes in the House of Commons whether, until the financial clauses in the Electricity Amendment Bill have been passed, it would be possible to frame any satisfactory or complete schemes for the establishment of joint electricity authorities. If the schemes are sound, we do not see why there should be any more difficulty in financing them through the ordinary channels than there is for any other enterprise. To say the contrary would be to acknowledge a weakness and the absence of public confidence. As a matter of fact, the aim of the electricity industry is to get money as cheaply as possible for its development. It is not to be blamed for this. But if the Government launches out into assistance of this kind, then other industries will have the right to claim equal consideration and help. The only reply Sir F. Hall got from Sir Eric was that he hopes to be in a position very shortly to make a statement as to the course the Government intend to pursue in the matter. The Government, we should imagine, after what has occurred and is occurring, will still hesitate.

Government Financial Aid and Purchase.

The position of motor hire is engaging the attention of many suppliers of electricity. There have been, owing to the flight in initial and maintenance costs, hire charge revisions in many places; and with the lives of motors only running from ten to twelve years, and a good deal having to be spent on their maintenance, there is still some anxiety on this score, and in not a few places there will have to be further amendment of the hire rate. We recently referred to the question in connection with Warrington [p. 444]. Now the Brighton Corporation have come to the conclusion that, in view of the increasing cost of motors, their hiring policy should be modified. On the recommendation of the Electrical Engineer, the Electricity Committee have been empowered to ask the Electricity Commissioners to sanction a loan of only £1500 for the purchase of small motors up to 5 H.P.; and consumers requiring motors over this rating are to make their own arrangements to purchase them direct. On small ones up to 5 H.P., the rental is in future to be 20 p.ct. on net cost. That is pretty tall; but it is only fair in the circumstances. Of course, the average horse power of motors let out on hire is very small. We see that at Eastbourne, the last report of the Electricity Committee states that there are 360 motors connected, totalling 1270 H.P., which is an average of 3·52 H.P. At Bury, Lancs.—industrial area that it is—the motors connected number 1107; and the total horse power is 9306, or an average of only 8·4 H.P. As Sir Dugald Clerk told the electricians in his reply to the discussion at the Institution of Electrical Engineers [see "JOURNAL," July 21, p. 133, and July 28, p. 176], it is above 5 H.P. that there is an ever-increasing output of gas-engines. Sir Dugald knows very intimately what he is talking about when he declares: "The only effect the electric-motor has had on the gas-engine industry so far is to push-up the average power of individual gas-engines. At a certain power, it becomes more economical to use a gas-engine for a small works than an electric-motor; and accordingly gas-engines are so used in very large numbers."

Motor Hire and Motor Use.

Last week some comments were made on the address delivered by Mr. J. R. Beard to the North-Eastern Centre of the Institution of Electrical Engineers. Those comments were made on the strength of an abstract that had appeared in the electrical papers. We are told it is due to the

Gas and Electrical Industries.

drastic abbreviations made by the electrical journalists that the erroneous idea was given to us that Mr. Beard intended to draw invidious comparisons with the gas industry. The particular remark which was quoted by us, to the effect that the electricity industry had not been affected by the changed conditions more than the gas industry which is its rival in the domestic field, follows on some figures in a table that compared the pre-war and post-war conditions which were not published in any of the abstracts. These are the figures:

Electricity Supply.

283 Undertakings, 1913-14; 304 Undertakings, 1919-20.

	1913-14. Per Cent.	1919-20. Per Cent.
Total Working Expenses / Total Revenue	46·5	64·3
Gross Profit / Total Working Expenses	115	55·6
Gross Profit / Capital Expenditure	7·57	7·76

Gas Supply.

52 Undertakings, 1913-14; 50 Undertakings, 1919-20.

	1913-14. Per Cent.	1919-20. Per Cent.
Total Working Expenses / Total Revenue	80·2	87·5
Gross Profit / Total Working Expenses	24·6	14·3
Gross Profit / Capital Expenditure	5·06	5·74

These figures are not weighted with value either as between approximately 300 electricity undertakings and 50 or so gas undertakings, nor as between 1913-14 and 1919-20. In other respects, too, they are deficient, but it would mean a long discussion to enter into all the aspects presented. However from no other point of view, it now appears, was any comparison with the gas industry attempted; and we that gather Mr. Beard would be the last to deny that it is doing very valuable work in improving town conditions by the increasing use of gas heating for domestic purposes. So far from claiming the universal suitability of electricity for heating purposes, he made the following remarks:

> It is also generally agreed that electricity is the most efficient lighting agent; and it is putting up a good fight, both industrially and domestically, and against older and strongly entrenched competitors, as a distributor of heat. While its extensive use in this latter capacity is at present uncertain, it must always be borne in mind that any pronounced improvement in the economy of conversion of heat into mechanical or electrical energy will at once swing the pendulum strongly towards electricity as the universal distributor of the higher grades of heat.

We also quoted Mr. Beard as giving the rises in the cost of engineering labour and engineering materials as respectively, 323 p.ct. and 340 p.ct. Actually, he gave figures of 323 and 340 as being comparable with a figure of 100 pre-war—namely, increases of 223 and 240 p.ct. respectively. Abstracts are at times misleading things. This is one of the times.

Ownership of Distribution Systems.

As President of the Indiana Coke and Gas Company, of Terre Haute, Mr. Warren S. Blauvelt discusses, in an article appearing in the "Gas Age," the advantages of a municipal distribution system. He says that, wherever gas pipe-lines are needed, their construction increases land values in the area affected by an amount far exceeding the cost of the mains. Land owners in such areas reap the financial reward from the gas company's investment. The land user who is also a gas consumer pays more than his fair share of the capital cost of the gas distribution system when he buys or rents a plot; and then he has to pay interest, depreciation, maintenance charges, and taxes on the gas-mains when he pays his gas bill. This is clearly dishonest financing. The landowner gets what he does not pay for; the gas consumer pays twice over for what he gets; while the gas company, if adequate rates are allowed, get only an honest return upon their actual investment. Honest financing requires that gas-mains should be paid for, and maintained, by a charge on the land values created by their presence. This naturally involves public ownership of the distribution system. There should be no charge for the use of this system. Any tolls or rental charges by the city would have to be charged to consumers; and the financial benefit would accrue to landowners. This method of financing the gas distribution system would make it possible to sell gas at lower rates than would otherwise be possible. Lower rates would increase consumption, and increased consumption would reduce manufacturing and merchandising expenses, and thus make possible still lower prices. Experience indicates that private capital should be invested in the competitive manufacturing and merchandising features of the business; but justice requires that the distribution system should be financed by the public through a tax on the land values produced by its existence. The public interest requires that the gas-works, with all the appurtenances required for the service of the public, should be exempt from taxation. Any tax levied thereon must of necessity be added to the cost of gas service, and paid for by the consumer in the price of gas. Hence the elimination of the tax on the gas plant would make lower gas rates possible.

DISSOLUTION OF THE EDINBURGH AND LEITH GAS COMMISSION.

A BRIEF HISTORICAL SURVEY.

By A. CANNING WILLIAMS, formerly Treasurer to the Commissioners.

THE authority known as the Edinburgh and Leith Corporations' Gas Commissioners, which came into being on July 24, 1888, was dissolved by the Edinburgh Boundaries Extension and Tramways Act, 1920, on the 2nd of last month. The life of the Commission, therefore, covered a period of a little over 32 years. Prior to the incorporation of the Commissioners, the supply of gas was in the hands of the Edinburgh Gas Light Company and the Edinburgh and Leith Gas Light Company. These Companies were acquired; and nine years later the Portobello Gas Light Company was purchased—the burgh of Portobello having become part of the City of Edinburgh. The Act of 1888 laid down that the constitution of the Commissioners was to consist of the Lord Provost of Edinburgh, the Provost of Leith, and "fifteen persons to be elected by the City of Edinburgh and six persons to be elected by the Corporation of Leith"—in all 23; and within a few days of the passing of the Act, the 21 persons were duly elected. All the original Commissioners have passed away save one—Mr. James Smith Clark, S.S.C., who, in spite of his years, occupies the position of Auditor of the Court of Session in Edinburgh.

One of the first things to engage the Commissioners' attention was the appointment of the chief officials. Mr. James M'G. Jack, S.S.C., secured the office of Statutory Clerk (he retired on the 14th ult., after 32 years of continuous and efficient service); Mr. Robert Mitchell and Mr. F. T. C. Linton were continued as Engineers of the Edinburgh and Leith works respectively; Mr. John S. Gibb (of the Edinburgh and Leith Company) was appointed Treasurer; and Mr. Robert Cockburn (of the Edinburgh Company), Collector.

IMPROVEMENTS NEEDED AT THE WORKS.

The Commissioners seem to have been early impressed with the necessity of bringing both the gas-works up to date; and in September, 1890, a Sub-Committee was appointed to inspect gas-works where automatic coal-breaking and stoking machinery was in operation. A number of towns were visited, and a report prepared, in the course of which it was stated that if stoking machinery were introduced into the Leith works the cost of the alterations "would probably exceed the benefits to be derived." As regards the Edinburgh works, the possibility of a change of site precluded the Committee from giving any advice. So the matter was allowed to drop until the early part of 1892, when both Engineers were instructed to report as to how the works at Edinburgh and Leith could be altered to meet the increased demand for gas. The reports were prepared; but no action was taken at the time, because of a reduction in the sale of gas, and of "the possible general introduction of electric lighting into the area of supply." Eighteen months later, however, Mr. Linton's report was considered by the Works Committee, who recommended that the extensions and alterations suggested (involving an expenditure of £94,000) should be carried out. But when the recommendation came before the full Board, it was resolved to delay consideration of the matter.

PREPAYMENT METERS.

During September, 1893, a remit was made to the Works Committee "to make inquiry as to the penny-in-the-slot gas-meter, and to consider whether it could be adopted with advantage." Mr. Linton reported on the question. He argued that there was not much scope for prepayment meters in Edinburgh and Leith; that their cost was about twice that of ordinary meters; and that the meters which would be displaced would have to be broken-up and sold as old metal. He admitted, however, that if the Commissioners were to sanction the issue of slot-meters it would be a boon to the large number of small consumers who had to pay deposits. The Commissioners decided against introducing prepayment meters; but in June, 1896, a few experimental installations were made. During recent years, there has been a steady increase in the number of slot-meters—which now total 16,300; but the proportion to the total number of consumers (15 p.ct.) is low as compared with most large towns.

STOKING MACHINERY AND CARBURETTED WATER GAS.

In 1894 the Commissioners, after exhaustive reports by their Engineers on the subject, and visits by some of their number to Peebles, Galashiels, and Perth, resolved to erect at the Edinburgh works an installation of Messrs. Young and Bell's oil-gas enrichment process; and a Sub-Committee was appointed to deal with the matter. Another visit to Peebles was made. Some of the members went to the Glasgow Gas-Works and inspected the water-gas plant in operation there; while others visited Belfast, where similar plant was employed. More reports from the Engineers were called for; and, finally, the Sub-Committee recommended the adoption of Mr. Linton's suggestion—namely, "that the Commissioners should not at present instal an oil-gas or carburetted water-gas plant, but should meantime hold their hands, and await the further development of events which must shortly be arrived at." The recommendation was approved.

On the same day that this decision was come to, the Commis-

sioners agreed to introduce mechanical stoking machinery and coal-breaking appliances into the Edinburgh works; and at the next meeting (April, 1895), the offer of Messrs. Sir Wm. Arrol & Co., Ltd., for the supply and erection of the plant, was accepted. The year 1895 was a memorable one in the history of the Commissioners; for in it they decided to instal not only the machinery referred to but also two sets of carburetted water-gas apparatus, each capable of producing a million cubic feet per day.

MR. W. R. HERRING APPOINTED ENGINEER AND MANAGER.

The difficulties of maintaining an adequate supply of gas from works that were too small must have been a constant source of worry to the Engineers; so one does not read with surprise the short statement in the minutes of July 27, 1896: "On account of his ill-health, the Commissioners granted Mr. Mitchell, Engineer, leave of absence for three months." Mr. Mitchell does not appear to have benefited much from his rest; for the following November the Commissioners appointed a Special Committee to consider and report on the whole subject of the engineering staff. Before a month had elapsed, Mr. Linton passed away. The Commissioners adopted the recommendation of the Committee that, in view of the state of Mr. Mitchell's health and the death of his colleague, the works should be under the control of one engineer. In response to the advertisement, 41 applications were received; the successful candidate being Mr. W. R. Herring, the Engineer and Manager of the Huddersfield Corporation gas-works, who took-up his new duties on April 1, 1897. In the following month Mr. Mitchell (who had retired on a pension) departed this life.

One of the Engineer's first tasks was to write a report on carburetted water gas, with a view to allaying the anxiety of the public, as reflected in letters to the local press, as to its alleged harmful properties. The report was an exhaustive and convincing one, and appears to have completely served its purpose.

NEW WORKS AT GRANTON.

Mr. Herring quickly sized-up the state of affairs at the two gas-works, and saw that there was only one cure—a new works on a fresh site. His proposal was that, in the first instance, extensions only should be laid down on the new site, and that subsequently such portions of the existing works as were worth removing should be transferred. After weighing-up the *pros* and *cons* of various sites, Mr. Herring advised that the one at Granton was the most suitable, on account of its railway and harbour facilities, and its physical conformation, &c. Before acting on this advice, the Commissioners consulted Mr. (afterwards Sir George) Livesey, who supported Mr. Herring's views *in toto*, both as to the site and the necessity for a new works. Mr. Livesey ended his statement in characteristic fashion: "Being desirous that you should get this report on Saturday, I have not time to rewrite and shorten it. I should have liked to follow the example of Sir William Arrol, who, when asked by the Corporation of Glasgow for a report on a certain old bridge, simply and concisely said, 'Take it down.' In like manner I would say, 'Secure your site, and build your new works as soon as possible.'"

Within a short time an agreement was entered into with the Duke of Buccleuch for the purchase of a large plot of land at Granton. In the following May (1898), the Commissioners obtained parliamentary sanction to erect the new works, &c.; in November, a tender was accepted for the construction of the tank for a 7,000,000 c.ft. holder; in October, 1899, the ceremony of laying the foundation-stone of the retort-house was performed; and on Feb. 27, 1903, the formal opening of the works took place, in the presence of a number of representative citizens. The site of the works is on the southern shore of the Firth of Forth, and about four miles from the General Post Office in Edinburgh.

It will be within the recollection of many readers of the "JOURNAL" that Mr. Herring contributed thereto a series of valuable articles, accompanied by numerous drawings and photographic illustrations, which gave a full description of the constructional details of the works. These articles appeared week by week from January to July, 1903. It was—as the Editor well observed at the end of the series—a striking literary performance, and, as a descriptive account of a large new gas-works, certainly unprecedented. The matter was subsequently re-written and extended, and, with additional illustrations, was published in book form.

BOGEY OF MUNICIPAL TRADING.

In 1904 the Commissioners decided to lease two shops in Edinburgh and one in Leith, to be used as district show-rooms and offices for receiving complaints, &c. This quickly conjured-up the bogey of municipal trading, and aroused strong opposition. Petitions were sent in, deputations received, and conferences held. Mr. Herring wrote a trenchant report in favour of the Commissioners' policy; and eventually it was decided, by seventeen votes to four, to continue the show-rooms as being necessary to the success of the business.

POLLUTION OF WELLS.

It was at about this time that a claim was made for the pollution of a brewery well, caused, it was alleged, by tarry and other matter from the site of the old gas-works in Edinburgh. The Commissioners resisted the claim; and the case was fought-out in the Court of Session, when judgment was given in favour of the pursuers. Other claims followed at intervals; and altogether the unhappy percolation has cost a good many thousands of pounds. Within recent months, and at considerable further expenditure, a deep well was sunk on the site, in the hope that the objectionable matter would drain into it, and so cause no further trouble.

SUPERANNUATION FUND.

In December, 1907, the Commissioners decided to apply for a Provisional Order to empower them to raise further money for their undertaking; to extend the period for the completion of the works; to establish a superannuation fund, &c.; and twelve months later the Order received the Royal Assent. The question of forming a superannuation fund was considered by the Commissioners from time to time, as it was felt that the existing system of granting voluntary allowances to old or disabled workmen was not altogether satisfactory. On May 15, 1909, the superannuation fund came into operation; all the permanent officials and servants being embraced in it, and their period of service under the Commissioners and under either of the old Companies being aggregated and reckoned for superannuation purposes. The contributions to the fund were to be at the rate of 5 p.ct. on salaries and wages; one-half to be paid out of the revenue of the Commissioners, and one-half by the employees. Acting on a report by their Actuary, the Commissioners agreed to make a special contribution of £2035 per annum, in order (as it was hoped) to put the fund on a sound financial basis. Subsequent actuarial reports, however, showed that this sum was not sufficient; and the Commissioners were therefore reluctantly compelled to increase the rate as from May last to 7½ p.ct., which is ½ p.ct. below the maximum rate authorized by the Order.

MR. A. CANNING WILLIAMS APPOINTED TREASURER AND COLLECTOR.

Power was also given to the Commissioners under the Order to amalgamate the offices of Treasurer and Collector, and appoint the same person to both positions; and in January, 1910, it was decided to take advantage of the provision. An advertisement was duly inserted, which resulted in 119 applications being received, and the appointment of the present writer (then Secretary and Accountant to the Reading Gas Company), who took up his duties in August. He would like to take this opportunity of saying that he will never forget the courtesy and anxious desire to help displayed by both Mr. Gibb (the father, by the way, of Mr. W. Doig Gibb) and Mr. Cockburn, during the fortnight they remained in office after the writer's arrival. It appears as a green and refreshing spot, when he looks back upon his official landscape.

RESIGNATION OF MR. HERRING.

In June, 1910, Mr. Herring tendered his resignation as Chief Engineer and Manager, as he wished to be free to follow his profession of a civil engineer. Efforts were made to induce him to withdraw his resignation, but without avail. He, however, consented to act as Consulting Engineer—a position he still retains—and Mr. Alexander Masterton, who was Mr. Mitchell's and Mr. Herring's Chief Assistant, was appointed Engineer.

FREE COOKERS, &c.

The centralization of the manufacturing operations at Granton resulted in considerable economies (apart, of course, from capital charges); but there had been little expansion in the sale of gas, a fact which was brought prominently before the Commissioners by the then Lord Provost in November, 1911. The result was that the Engineers and the Treasurer were instructed to offer suggestions for increasing the consumption of gas. These reports were submitted the following January; and it was subsequently agreed to adopt the principal recommendations—namely, that gas cookers, grillers, &c., should be supplied on free loan to approved consumers; that gas-fires should be let out on hire; that the extra charge to prepayment consumers should be reduced; and that arrangements should be made for cookery lectures and demonstrations in different parts of Edinburgh and Leith.

The "forward policy" was beginning to yield excellent results (the sale of gas for 1913-14 was the highest on record); and then came the war. Public and stair lighting was restricted—the former was practically abolished for three years—and though the quantity of gas sold to private consumers during the war years, with the exception of 1916-17, showed an increase, this increase would in all probability have been much larger but for the great upheaval. It is, however, beyond doubt that there would have been a heavy falling-off in sales if it had not been for the large number of gas cookers, fires, and other appliances that had been supplied. It will be observed from the figures hereunder that a marked recovery in the consumption took place in 1917-18 and 1918-19, and that 1919-20 constituted a record. In that year, also, a heavy accumulated deficiency of revenue was more than wiped-out; so the Corporation of Greater Edinburgh have taken over the concern under very favourable conditions.

Sale of Gas, 1913-14 to 1919-20.

Year.	Private Consumers.	Public Lighting.	Stair Lighting.	In Bulk.	Total.
	C.Ft.	C.Ft.	C.Ft.	C.Ft.	C.Ft.
1913–1914	1,866,539,900	83,491,400	66,843,600	2,366,800	2,019,241,700
1914–1915	1,867,373,700	51,519,600	66,399,700	3,035,500	1,988,328,500
1915–1916	1,890,856,700	2,679,100	52,495,400	3,382,800	1,949,414,000
1916–1917	1,817,063,700	1,022,300	52,375,500	3,652,600	1,874,114,100
1917–1918	1,920,768,800	2,390,500	52,494,200	4,185,600	1,979,839,100
1918–1919	1,937,513,300	14,403,100	55,911,500	1,208,800	2,009,036,700
1919–1920	2,071,790,000	56,110,400	67,476,400	1,187,100	2,196,563,900

NEUTRAL SULPHATE OF AMMONIA BY THE WILTON PROCESS.

IN the paper read before the Southern District Association of Gas Engineers, reported in the "JOURNAL" for the 1st inst. [p. 515], Mr. E. V. Evans described his process for making neutral sulphate of ammonia, and advised all gas companies to adopt some form of plant in order to compete with the improved product in all markets of the world. Mr. Evans refrained from giving his opinion on the actual type of plant to adopt; but he did mention the names of Capron, Adam, Linder, Lessing, and Sheard as guides in the selection of suitable plant.

Looking through the records of patented inventions described in the "JOURNAL" during the last two or three years, we were reminded of a process by Mr. Norman Wilton, of the Chemical Engineering and Wilton's Patent Furnace Company, Ltd., which undoubtedly should be included among those plants that gas engineers are advised to inspect.

Interviewed by us, Mr. Wilton stated that his Company had been experimenting on the problem since the first attempts had been made in this country to produce neutral salt on a practical scale; and in 1918, facilities had been given to his Company, by the courtesy of Mr. A. E. Broadberry, to carry out a trial at the Tottenham Gas-Works. The installation was afterwards made permanent, at all events until any improvements came along. Since then the apparatus has been installed with success at ten gas-works; and the Company have orders to fit similar plant at several other gas-works, &c.

Asked as to his opinion of making neutral sulphate, Mr. Wilton replied that it was quite a simple matter on moderate-sized and large works: but at present it entailed rather an expensive outlay for small works. In all cases, however, there is much to be done before the ideal is reached. The chief troubles to guard against are:

1.—The extra mother liquor produced when washing the crystals in a centrifugal, if a weak aqueous solution of ammonia is used.
2.—The pyridine released when the free acid is removed by an alkali.
3.—In some types of ammonia still—especially when weak gas liquor is being worked—it is difficult to find a point in the column from which ammonia may be taken which is always safely free from H_2S and HCN, and yet strong enough in ammonia for use without concentration plant being added.

Invited to describe his Company's process, Mr. Wilton pointed out that it varied according to circumstances, and improvements were coming along; but he said he would explain one type which was quite a good business proposition—certain to work, and having the further advantage that household or domestic ammonia was produced, which in connection with several installations they had fitted was being sold locally at a good profit in bottles, and for laundry use. The cost of a complete installation of this type for treating from 2 to 6 tons of sulphate per day, and giving a good surplus of pure ammoniacal liquid for household use, was under £300.

This arrangement applies very well to works making from 2 to 6 tons of sulphate per day. Pure ammonia liquid, about 10 to 15 p.ct. NH_3, is made in a "generator" by mixing a small quantity of mother liquor with about a bucketful of milk of lime, and heating with steam. The ammonia liberated is absorbed in a closed tank, which holds about 100 gallons of 10 to 15 p.ct. strength. The pure ammonia is run into cold mother liquor, making it slightly alkaline. This, in turn, is elevated to the feed-tank.

The neutralizing operation is carried out in the basket of the centrifugal machine; but if there is no centrifugal (which is the case at small works), a draining bucket may be used. To neutralize a 3 to 4 cwt. charge of sulphate, from 2 to 4 gallons of the washing liquor is run in from the feed-tank. The tank is graduated to show the quantity; and it may be arranged that the operator need not stand over the centrifugal in cases where the pyridine is given off. The quantity of ammonia actually necessary to perform the operation is found to be rather less than the theoretical amount needed to combine with the free acid—this being due to the fact that some of the acid is mechanically carried away by the washing action. The alkaline washing liquor may be made either partly or wholly with water, if there is no mother liquor at hand; but naturally the use of water continuously would be likely to produce more mother liquor than could be used up in the plant.

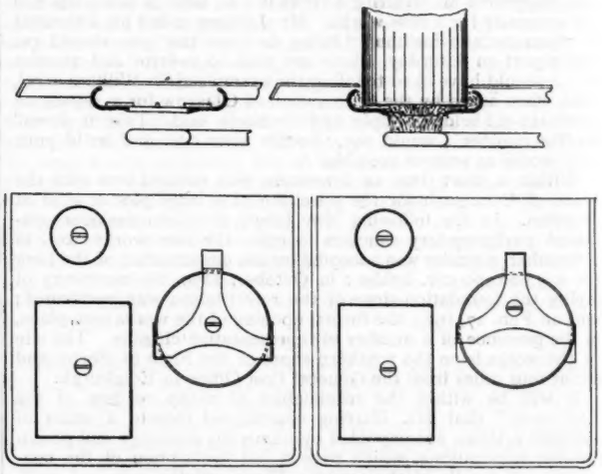
The smell of pyridine is evident in this process, as it must be in any of the similar ones; but there are remedies which may be adopted to reduce it to a minimum—such as continuous acid feed to the saturator. It appears that pyridine is most evident in cases where the tar has not been entirely separated from the liquor in the wells. There is one thing certain, however—in this system there can be no H_2S or HCN, as the source from which the ammonia is obtained makes this impossible.

The Chemical Engineering Company carried out a series of experiments several years ago for Mr. Trewby at the Mill Hill Gas-Works, in an apparatus attached to the ammonia still. This gave a concentrated solution of ammonia of any strength required; and the solution could be used for neutralizing the sulphate in much the same way as described above. It is not, however, pure enough for domestic use; and it is found that a good installation on these lines has no advantage over the other as regards first cost.

The final drying process is also being tackled by the Chemical Engineering Company, and one installation is being made. Mr. Wilton did not give any details, but expressed the hope that patent No. 141,798 of the South Metropolitan Gas Company would not be used against any sulphate manufacturers wishing to dry their salt by the obvious method of applying heat. He, however, felt sure this was not the intention. At all events, he said he would have an installation at work in a few weeks making anhydrous sulphate, and one suitable for application to any works making neutral sulphate.

THE SUGG-LARKIN HOT-PLATE.

IN the course of the discussion on the paper which he read towards the end of last month before the London and Southern District Junior Gas Association, one of the speakers mentioned that Mr. F. S. Larkin had designed a cooker hot-plate embodying the principles which he advocated. This hot-plate is now being made by Messrs. W. Sugg & Co., of Regency Street, Westminster, at the invitation of whose Managing Director (Mr. W. Mattock) the writer has inspected samples of the invention, the object of which is to combine as far as possible the economy of the solid hot-plate for multiple boiling with an improved efficiency in connection with boiling in a single vessel. The main work of the hot-plate is accomplished with one burner which, in single boiling, is capable of boiling a quart of water in a 7½-in. diameter kettle in about 4¾ minutes, with a consumption of 1¾ c.ft. of gas. The burner is placed under a cast-iron economizer beneath the solid top; and the vessel sinks into this when single heating is required. The kettle-rest in this economizer is so designed that it restricts the free flow of secondary air to the burner to a certain extent, and thus prevents a much larger volume of air being heated-up than is required for combustion. The kettle-rest being separate from the economizer, the heat is not conducted away rapidly, as is the case where ordinary bars are concerned. When two vessels are required to be heated, one should be placed in the well and heated-up, and then put over the small burner to keep hot while the second one is heating-up in the well.



Details of the Sugg-Larkin Hot-Plate.

For the heating of three vessels, a triangular plate (called the triplate) is provided, which can be adjusted to either give equal boiling power to all three vessels, or, by sliding the triplate back, one can be kept boiling, while the others are merely simmering. While this is going on, the whole of the hot-plate is getting well heated, and opportunity should be taken to place on it any other vessel which requires heating. The heating of the three vessels over one burner is found to give a much better result than heating over three separate rings; the gas used being just about one-half that required on the open hot-plate, without considering the heating-up of other vessels while this is in progress. Should the whole hot-plate be required for work, the solid plate provided is put over the well, and the grill-burner used, with the frets lowered, as a boiling-burner. Then the top can be employed just the same as a kitchen coal-range, the vessels being moved about freely as desired.

As to the economizer, this does not fit close-up to the underside of the hot-plate—a space of about ¼-in. being left. By this means the products of combustion pass rapidly out in close contact with the plate; and there being a continuous current of secondary air to the burner—unaffected by the products of combustion—there is no suggestion of smother or smell. It may be urged that compelling a consumer to use a 7½-in. diameter vessel restricts his choice; but as this is a standard size obtainable from any ironmonger, the restriction is no hardship, and is more than com-

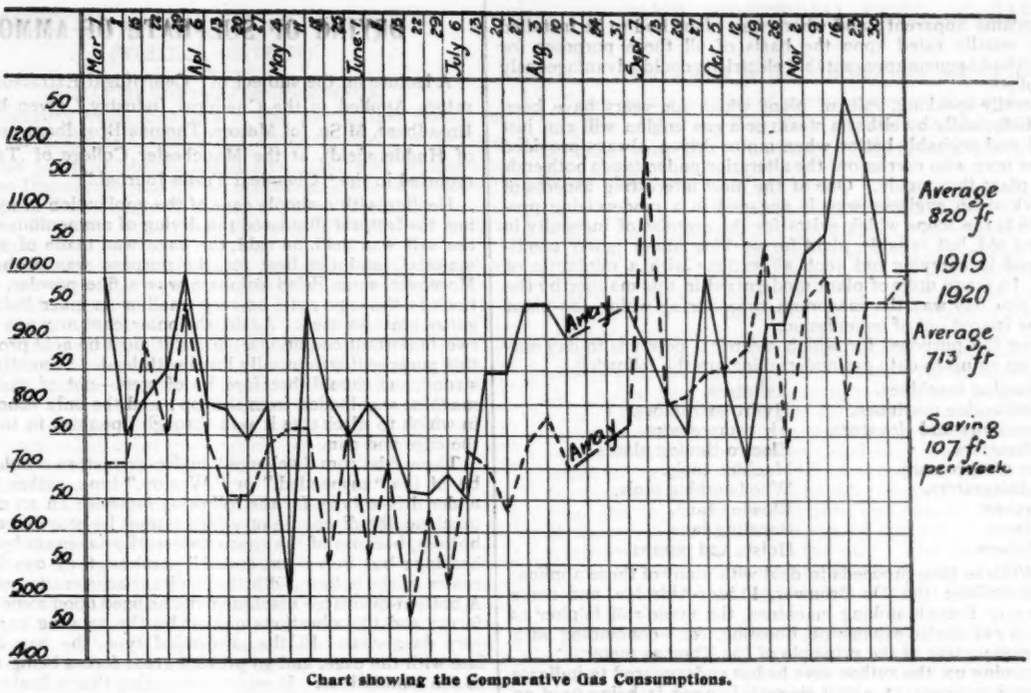


Chart showing the Comparative Gas Consumptions.

pensated for by the economy effected. As a matter of fact, it is said that the economy secured by a smaller vessel is almost as good as with the full-sized one, when compared with the same vessel on the bars of the ordinary gas-cooker. If the vessel is too large to sink in the well, the efficiency is not so good in raising to boiling-point; but this loss is amply repaid by the smaller amount of gas required to maintain boiling, when this point has been reached. The sides and back of the hot-plate are enclosed, and there is a dropping door in front. This forms a very fine warming chamber for plates, &c.

At present these hot-plates are being applied to Messrs. Sugg's cookers in three sizes—the "S.," "M. L.," and "L." In the "S" (small) size, the cornice and plate are all in one; but in the "M. L." (medium) the plate drops into the ordinary cornice. The burners and fittings are the same in both cases. With the "L" (large) size, the big burner takes a 9-in. vessel, while a smaller one (fitted with the economizer) takes a 6-in. vessel. Another point worth noting in this cooker is the automatic oven regulation, by means of a damper worked in conjunction with the oven-cock. This is not really a new feature, as it was fitted on one make of cooker some years ago. With the present price of gas, however, every economy is of great importance; and this one makes the oven far more efficient.

What can be done by using a hot-plate such as the Sugg-Larkin can be seen from the chart herewith, which gives the actual gas consumption in a house for nine months in 1919 and 1920. The 1919 line was obtained with what is regarded as a high-grade cooker; while the 1920 one is with the new hot-plate—showing an average saving of 107 c.ft. per week, or about 5000 c.ft. per annum. This, it will be admitted, is a very substantial reduction.

ELECTRICAL POWER FOR GAS UNDERTAKINGS.

A paper was contributed by Mr. H. C. Widlake, of Plymouth, some while ago, to the proceedings of the Institution of Electrical Engineers, in which he gave an account of the applications of electrical power on modern gas undertakings—a subject which, as readers will remember, has been dealt with by him from time to time in articles appearing in the "JOURNAL."

It is pointed out by Mr. Widlake that practically every branch of the engineering trades has, during the past few years, opened its doors to the electrical system of power application, quite irrespective of whether such trades were or were not, either directly or indirectly, in competition with the electrical industry. Among a host of other purposes, electrical power has been extensively adopted for the operation of the various units of plant on the works of the principal gas undertakings in this country, upon the Continent, and in the United States of America. In view of the special conditions which have to be catered for in connection with such plants, there are few purposes for which the electric motor is more admirably adapted, and no greater compliment has ever been paid to it on the ground of reliability, than that implied by the readiness with which gas engineers have adopted it for driving their most important units of plant.

In the past, and to a certain extent at the present time, there has been, and is, an unfortunate tendency on the part of gas undertaking officials to treat the fact that they themselves are users of electric power as a great secret, and to admit it only in a shamefaced, apologetic sort of manner. Such an attitude is wholly illogical, and indicates a lack of confidence in one's convictions. Indeed, the progressive gas engineer has no cause whatever to be ashamed of the fact that he uses electrical power on his works, nor need he fear that by so doing he is playing into the hands of his competitors. By introducing electrical power on a large scale into his works, the gas engineer demonstrates his acquaintance with the subject of the economical distribution of power and of those principles by which power, converted to a suitable form, may be economically applied over a wide area. The question has been raised whether it is a wise policy for a gas undertaking in active competition with an electrical supply authority to introduce electrical power into its own works' processes; and there are to-day gas undertakings on which the works power costs are kept unduly high by the unfortunate deference on the part of those in authority to this prejudiced and wholly illogical view. Such a policy is manifestly unfair both to the shareholders and the consumers of the undertaking pursuing it, and is against the interests of the gas industry as a whole. A still more absurd phase of the question is to be found in works which go to the expense of installing the most modern type of stoking and handling plant, and then, in fanatical adherence to such old-time prejudices, handicap the plant from its start by the application of some other form of power motors to machines which were expressly designed for electrical operation, and which in this manner are rendered inefficient, costly to maintain, unreliable, and, in some instances, distinctly dangerous.

It is generally recognized that the first steps towards economy and efficiency in working in all industries lie in the abolition of isolated power plants, which are scattered about a works (particularly where such plants are steam-driven), and the production in bulk of all the power required at a centrally-situated power-house, from which it could be economically distributed to those points at which a demand for power existed. A modern gas-works, with its many power-using units of plant scattered over a wide area, offers ideal facilities for the practical demonstration of this principle, the soundness of which, within the last ten years, has been realized by a large number of gas undertakings, after what can only be described as a period of stagnation.

In connection with the earlier electrical installations on gas undertakings, it must be confessed that the responsible engineers had a very rudimentary knowledge of electrical science; and, in consequence, the general type of plant laid down was in a great measure left in the hands of the contractors who were supplying the machinery for which electricity was required. Their interests, naturally enough, did not extend beyond the particular machinery for which they were contracting; and the plant installed was rated more or less upon the demand created by the machinery. Had a contractor ventured to suggest that generating plant of a higher rating be installed, with a view to future demands coming on it, there is no doubt his reception would have been the reverse of cordial. Thus, there is little doubt that the contractors did their best; and things, on the whole, went very well, except that in most cases, owing to the poorness of the load-factor (equivalent to that of a crane installation in the earlier gas-works plants), the plant did not operate with that degree of efficiency which a new order of things has brought about. It was only when the question of extending the scope of the electrical plant came up for consideration that the limitations of the existing generating

sets became apparent; and where new plant had to be installed it was usually rated upon the basis of all those purposes for which it had become apparent that electricity could advantageously be applied.

Generally speaking, units of plant which for years have been run satisfactorily by either a steam or a gas engine, will run just as well, and probably better, when motor-driven, always provided that the man who carries out the alteration understands both ends of the plant thoroughly. One of the most interesting aspects of the work of an engineer who is engaged in a modernizing programme is the scope which exists for the exercise of ingenuity in adapting old, but reliable, plant for working under newer conditions, and in carrying out such alterations with a minimum of delay. In many units of plant modernized in this manner by the author one day was the maximum time during which the plant could be spared out of commission.

Among the purposes for which electrical power is to-day employed on an up-to-date gas undertaking are the following:

Charging machines.	Agitators.
Discharging machines.	Hydro-extractors.
Conveyors and elevators.	Air compressors.
Exhausters.	Electro-tinning plants.
Gas compressors.	Machine tools.
Disintegrators.	Woodworking tools.
Washers.	Blowing fans.
Cranes.	Boosting fans.
Telphers.	Hoists and pumps.

Mr. Widlake then proceeds to deal with many of these applications—describing the De Brouwer, Fiddes-Aldridge, and some of the early French stoking machines, the mono-rail telpher as applied to gas-works, exhausting, boosting, &c.—concluding with a short explanation of the principle of the Thomas meter.

In summing-up, the author says he has endeavoured to indicate the increasing extent to which electrical power is being used on modern gas undertakings; and this fact, together with the growing popularity of the internal combustion engine for the purposes of electrical generation—particularly as regards large-capacity units working in conjunction with modern bye-product recovery plants—must ultimately result in members of both the gas and electrical professions taking a broader and altogether more reasonable view of the entire subject of power competition. A further result of modern practice in the above connection lies in its effect upon the training and experience of the modern gas engineer, which must result in future in widening the scope of the industry. From small beginnings large issues spring; and it is impossible to estimate what important results may arise from the small introductory use, a few years ago, of electric power for the operation of a single unit of gas-works plant. It may even lead in certain districts to the gas-works being the sole place at which coal will be used on a large scale, and therefore the source from which electricity purveyors will draw the necessary fuel for the operation of their generating sets. Alternatively, it may lead to an extensive fusion of gas and electrical interests in connection with big-scale joint undertakings—"joint" not only as regards business control, but in the technical sense of the word, for the supply of light, heat, and power to the public.

Chemical Control on Gas-Works.

The question of chemical control as an aid to reducing present-day abnormal manufacturing costs was dealt with by Mr. F. J. Kennedy, in a paper contributed to the Canadian Gas Association. It was pointed out by him that the increasing cost of gas manufacture and supply which undertakings now have to meet demands a closer watch on all sides to effect a total improved economy. The engineering side of gas manufacture has ever steadily advanced, and is still making headway. Large sums of money are being expended on plants to cheapen the cost of production. There is also a growing tendency to give better attention and supervision to maintenance work; and the importance of mechanical control of gas-works is now generally becoming better appreciated. In connection with the larger plants there is usually a chemist, who carries out the routine work of testing the raw materials and the finished products; but it is not generally recognized that, for the fully efficient operation of any plant, chemical supervision should extend throughout the twenty-four hours. There are many economies that can be effected if proper comprehension and attention are given to details of works operations; but one finds directorates of gas undertakings who are unwilling to give their engineers the requisite staff and apparatus. Directorates of this kind would appear to regard their problems from the viewpoint obtained by comparison of a month's operations with the results secured at some other time. Such comparative statements, while indicating the general position of the company, do not show whether the works are producing results fairly up to what might be expected; and so, without a proper system of chemical control, losses daily occur which are not recorded in any statement of costs, and which are not apparent from the balance-sheet. As an instance of the value of close chemical control, he remarked that a difference in the quality of gas of 1 B.Th.U. may mean an increased cost per day of $15 on a works making 12 million c.ft. of mixed coal and water gas daily. This is only one of many instances in which chemists, outside their ordinary laboratory work, can, acting as "waste detectives," assist in reducing costs.

DRYING OF SULPHATE OF AMMONIA.

A lecture on the subject of "Centrifugal Extractors and Separators Applied to the Chemical Industry," given by Mr. F. J. Broadbent, M.Sc. (of Messrs. Thomas Broadbent and Sons, Ltd., of Huddersfield), at the Manchester College of Technology, is reported in the "Chemical Trade Journal."

Dealing with a simple case of the application of hydro-extracting, the lecturer discussed the drying of ammonium sulphate. If the salt was acid, he said, the cage was made of acid-resisting material; and the best for the purpose was probably copper. Moreover, since dried sulphate was a fine powder, the perforations in the cage must be very small or an inner lining of copper gauze must be used. Again, the outer case or "pan" must fulfil two important conditions. First, it must be acid proof; and for this purpose it was usually lined with lead. Secondly, it must be strong, and should therefore be of steel—not of cast iron. The machine was loaded from the top; and the only economical way in which to discharge it was through openings in the bottom of the cage and pan.

These "bottom discharge" hydro-extractors should preferably be of the "suspended," or "Weston," type, rather than of the under-driven type, for the following reasons: In an under-driven machine, the discharge openings cannot be near the centre of the bottom, because of the space necessarily taken-up by the central bearing; but in a "suspended" machine they can be near the centre of the bottom, with the resultant acceleration of discharge. A bottom-discharge machine must be fixed upon some raised platform; and the vibrations caused by the rotating cage would be very dangerous. In the suspended type, the pan could oscillate with the cage, and so prevent great forces being transmitted to the foundations. It was worth noting that a brake could only be applied directly to the rotating cage when it was under-driven. With a suspended machine, owing to the swinging cage, the brake must be applied near the "top housing;" and as braking caused a much more severe twisting effort than driving, the driving shaft in this case had to be considerably stronger than necessary for the drive alone. If the sulphate of ammonia was neutral, a black steel cage should be used with a lead-lined pan.

The following figures as to performances, taken from actual practice, were given by the lecturer: A machine with a cage of 48 inches diameter dealt with seven charges in two hours, each charge weighing 3 cwt. The extracting was carried out by rotating at full speed (900 revs. per min.) for two minutes. The life of the gauze was six months and that of the cage five years. The moisture in the finished product amounted to just over 2 p.ct., and the ammonia to 25 p.ct. Two men were required for the working of the machine; and 4 H.P. was sufficient for driving. The problem of ammonium sulphate drying was typical of a great many problems.

The drying effect was less with large-sized machines for practicable speeds than with small machines. As to acid-resisting materials, the lecturer pointed out that one of the best methods was to coat the cage with vulcanite. All such vulcanite should be periodically tested electrically, however, as a very slight fissure would admit acid which might corrode the iron behind the vulcanite and lead to disastrous results.

Glasgow Gas Production.—Bailie Thomas Young stated at a meeting of the Glasgow Town Council that it was the case that the gas-manufacturing plant at the Provan works was producing far below its capacity; and this was due to the poor quality of coal being supplied, as compared with that received prior to the war. They were paying a very high price; but though they had repeatedly approached the Coal Controller, they were still in the same position.

Labour and Industry.—There has been issued as one of the publications of the University of Manchester a reprint of a series of lectures by well-known speakers on the subject of "Labour and Industry." The lectures were delivered during the session of 1919-20 in the Department of Industrial Administration in the College of Technology, Manchester; and the publishers of them in book form for the University are Messrs. Longmans, Green, & Co., of No. 39, Paternoster Row, London, E.C. The price of the book is 12s. 6d. net. There are in all twelve lectures; and the first of them is by Mr. J. H. Whitley, M.P., who deals with the question of "Works Committees and Industrial Councils." The topic discussed by Mr. J. R. Clynes, M.P., is "Organized Labour in Relation to Industrial Development."

Corrosion of Coke-Oven Walls.—The subject of the corrosion of coke-oven walls was dealt with at a meeting of the Liverpool Section of the Society of Chemical Industry by Mr. A. E. Findley, who said that work had been undertaken at the Birmingham University in connection with the effects on the walls of coke-ovens of salt, iron, and moisture. The high temperature of the vertical flues was conducive to corrosion of oven-walls. In the passing of iron through from the retorts to the oven-walls, ferrous chloride and oxygen could deposit oxide of iron, and, in forming this, would form ferric chloride, which was more oxidizing than ferrous. The ferrous chloride formed in the retort entered into the bricks where it was oxidized to ferric oxide and ferric chloride. This caused the corrosion of the oven-walls. As a preventive of corrosion, the use of silicate bricks was recommended.

SCOTTISH JUNIOR GAS ASSOCIATION
(WESTERN DISTRICT).

Visit to the Glenboig Fire-Brick Works.

Last Saturday week, members of the Association visited the works of the Glenboig Union Fire-Clay Company, Ltd., at Glenboig. The party numbered about sixty, and were received by Mr. James Dunnachie, jun. (General Manager), who, together with Messrs. John Douglas, James Allan, William Baird, George Reid, and Alex. Hannay, conducted the visitors round the various departments.

Particular interest was shown in the laboratory, where there were on view the various grades of fire-clay mined by the Company, as well as specimens of the manufactured material. Here one was struck with the elaborate facilities at the disposal of the Company to ensure that the materials are up to the required standard; and it was thus early evident to the members that the Glenboig Company attach considerable importance to the technical side of their products. The different processes of manufacture were explained by the guides; and it came as a surprise to most to learn what great possibilities lay in a piece of clay, and how many processes it had to go through ere it became suited for its particular purpose.

All the machinery is driven by electricity; the current being obtained from the Clyde Valley at 11,000 volts three-phase, and transformed to 440 volts. The motors in use total over 2000 B.H.P. The various drying stoves provided matter of interest for much more time than the members had at disposal. There were seen endless varieties of special shapes required for gas-works, coke-ovens, and furnaces of all descriptions where high heats are to be withstood. The works, buildings, and yards occupy about 30 acres; while the floor space for manufacturing purposes is fully 4 acres—sufficient to manufacture several hundred thousand ordinary sized bricks per day. The Glenboig Company, however, manufacture all shapes and sizes, comprising single articles from a few ounces weight to many hundredweights, the latter occupying the floor for many weeks during drying. The character of their machines for making fire-clay bricks, aiming as near as possible to the special characteristic of fire-bricks made by hand moulding, was explained; while a demonstration was given of pressing with specially constructed folding dies from the rough to the finished article. In the retort-shop the process of retort building was shown; a feature of this department being the capacity of the plant for securing a large output.

Particular interest was manifested in the method of burning bricks by gas, where the Dunnachie regenerative gas-kiln is in operation. The characteristic of this is that the burned-off chambers are utilized as regenerators for heating the air before it enters the combustion chamber of the burning-kiln. The waste heat is carried through the kiln in front of the burning-chamber, thus taking up all the useful heat in the gases, which ultimately pass to the chimney at about 350° Fahr. It may be here mentioned that one of the chief causes of failure on the part of those who have designed kilns for the burning of bricks with gas is the want of any proper distribution of gas and hot air throughout the burning-chamber, and a proper mixture of the gas with hot air at every point. In the Dunnachie kiln, the gas and hot air meet in the burner below the floor level, and along the one side. The flame flows up like an inverted waterfall into the mixing space above the burner, where the admixture is completed before the flame comes into contact with the material to be burned. The resultant effect is complete combustion followed by intense heat. Great masses of flame pass upwards through the space above the burner, which thus acts, not only as a mixing chamber, but also as a powerful heat radiator.

The tour through the works having been concluded, the members were entertained at tea in the Glenboig Institute.

Mr. JAMES DUNNACHIE, in extending a hearty welcome to the Association, expressed the pleasure it gave his co-Directors and himself to have the members at Glenboig. He mentioned that a unique occurrence had been recorded at Glenboig—his father had just completed sixty years with the firm. During this period great changes had taken place in the fire-clay industry. Sixty years ago the output consisted of about 3000 tons per annum, as compared with 150,000 tons a year at present, of which about 10,000 tons represented gas-retorts. Great strides had been made in research work in connection with refractory materials—a work in which the Society of British Gas Industries had taken a great interest. Only by the co-operation of manufacturers, users, and scientists could the best results be obtained, as an increased output meant heavier wear and tear in furnaces and higher heats; and it was necessary still to try to produce higher-class refractories. He thought a great deal could be done by way of cheapening production by standardizing the size of retorts, as a manufacturer could then build retorts for stock, knowing that he would find a market somewhere.

Mr. JAMIESON (the President) thanked Mr. Dunnachie and those members of his staff who had shown them round. What they had seen, he said, impressed them very much; and they would take with them happy recollections of their Glenboig visit.

At a meeting of the Midland Junior Gas Association tomorrow [Thursday] evening, Mr. S. W. Simmons, of Dudley, will read a paper on "Gas and its Uses."

SOME INDUSTRIAL USES OF GAS.

Papers Read to the American Gas Association.

There were a number of papers presented at the second annual congress of the American Gas Association which dealt with the industrial uses of gas; and some of them were briefly noticed on pp. 457-8 of the "JOURNAL."

Melting of Non-Ferrous Alloys.

With the appliances and knowledge on the subject now available, the melting of aluminium, copper, brass, and other non-ferrous alloys are processes of which 90 p.ct. rightfully belongs to the gas industry, said Mr. A. L. Palmer, of the Consolidated Gas Company of New York. In the city there are some ninety odd furnaces operating on gas fuel. They range from 50-lbs. capacity crucible up to 1000-lbs. tilting non-crucible furnaces; and 85 p.ct. are operated with Maxon-Premix burners. By far the greater part of his Company's work and success has been with single-chamber crucible furnaces of average capacity. As to metals melted, they have tackled everything from a nice easy yellow brass, up to a chrome-nickel alloy that requires something approaching 3000° Fahr. All of these are still running to the complete satisfaction of the foundry owner, financially and otherwise, and to the physical comfort and ease of the moulders and furnace-men, "whose friendship, by the way, is worth more than a hundred extra B.Th.U. in the gas." The Company "have yet to lose an installation for any reason chargeable to the gas furnace; and they have yet to lose a friend in any foundry because he adopted gas fuel."

The author drew attention to several points which, if neglected, will seriously endanger the success of the installation. As to gas supply, pipes and meters should be provided sufficient to give, without extreme pressure drop, 30 p.ct. more gas than is expected to be used; and this pipe should be carried full size, with shut-off cock, to within a foot of the burner, before reducing it to fit the burner connection. Avoid long burner-pipes. From fan to nozzle, 10 ft. is all the Company like to allow. Also avoid sharp bends in the burner-pipe. Use 45° bends where necessary, but a straight run if in any way possible. Care should be taken that the angle of the nozzle is such that the flame is midway between the crucible and the furnace wall. If it strikes the crucible immediately, it will quickly burn it out, and lengthen the time to melt. If it impinges or scrubs along the furnace-wall near the nozzle, it will cause the nozzle to burn away in a few heats.

Figures were quoted of actual furnace work. On medium-weight castings of yellow brass, quantity production, there was an average gas consumption for eleven heats of 311 c.ft. per 100 lbs. With some high-copper compositions, the average of twenty-five heats was 420 c.ft. per 100 lbs.; and the average consumption for foundry melting silver for ingots and shot metals, 196 c.ft. per 1000 oz. These figures, the author said, do not approach the results that are obtainable through refinement of furnace design, whereby the enormous flue losses can be largely saved. It remains to be seen, however, just how far such refinements can be carried, and whether they do not secure increased efficiency at the expense of ultimate economy and production over an extended period.

Gas the Perfect Fuel for Forging.

Results under actual operating conditions of the use of gas for forging are given by the Industrial Heating Department of Messrs. Henry L. Doherty & Co., who remark that the flame-temperatures of manufactured gases which are best for forging—coal gas, coke-oven gas, and blue water gas—are as high as, or higher than, any other fuel. It is a matter of some pride to the gas man to know that, if required, the gas-fired furnace will heat forgings just as fast and as hot as any other fuel. The greatest speed in heating the individual pieces is not, however, the condition required for maximum production or quality. A case is quoted as showing very definitely that too large temperature differential between furnace and metal heat is conducive neither to greatest production nor to highest quality. In this case, two furnaces were run on the test for over two months. The final figures showed that, though the average differential temperature in the gas-furnace was 100° Fahr. lower than that of the oil-furnace, the gas-furnace production was 12 p.ct. greater than the oil. Also, the oil-furnace had 800 p.ct. more burned forgings than the gas.

Probably the greatest amount of discussion which the problem of forging supplies is brought about by the subject of scaling. There seem to be three possible ways in which iron oxide or scale can be formed in a forge furnace. These are over-ventilation of the fire in supplying more air with the fuel than is required to burn it; inherent slow combustion of the fuel, coupled with poor mixture, due to the difference in physical condition between the air and the fuel; and the action of water vapour on red-hot iron causing scale to form. Gas fuel, owing to its great uniformity, and the ease with which it may be regulated to give any desired atmosphere in the furnace without the necessity of constant adjustment, is by far the best fuel to avoid scaling due to excess oxygen. With gas fuel there is a very rapid combustion, and in the case of regenerative furnaces almost instantaneous combustion, at or quite close to the burner, with very little chance of any free oxygen coming in contact with the steel, when the

quantity of air admitted is not greater than that required just to burn the fuel. As to mixture, of course, gas fuel has the great advantage that it can be mixed with the air intimately and homogeneously, thus tending to more rapid combustion and less scale. The third cause of scale is one that has caused some little discussion; and Prof. O. L. Kowalke, of the University of Wisconsin, in a paper which he read last year before the Wisconsin Gas Association, stated that the combustion of hydrogen and the hydrocarbons produces water vapour. At a bright-red heat (say, up to 1800° Fahr.), the water vapour reacts with the iron to form magnetic oxide and hydrogen. What percentage of the total scale is produced in this way would be hard to say; but experience leads them to believe that once a coating of this magnetic oxide is formed on the steel, there is no further action to speak of due to the water vapour. The question to be decided is not which fuels make this magnetic oxide, since all do, but which make the most of it. The average of some 200 tests comparing gas and oil as to scaling shows that gas has in the neighbourhood of 20 p.ct. less scale than oil, and that therefore the effect of water vapour in the products of combustion in producing scale is small relatively to the production of scale by the other two causes. Results of the tests showed absolutely no difference in the hardness of the scale from the two fuels.

Application of Gas to Galvanizing.

Of the three most common methods of galvanizing, said Mr. D. A. Flynn, of the Peoples Gas Company of Chicago, the gas industry is most interested in what is known as the hot-dip or wet process. This is the oldest and most widely used method, for the reason that it gives an excellent protection for a long period of time, and is very well adapted to small light work. Material to be galvanized by this process is dipped into a bath of molten zinc, and kept immersed until it attains the same temperature as the zinc, which varies from 780° to 950° Fahr. For many years coke was considered the fuel best adapted to this class of work; but latterly gas-burning equipment has been developed which has proved very successful and practical. Perhaps the greatest advantage of gas over coke is that it greatly increases the life of the kettles by eliminating hot spots.

A brief description was given by the author of a gas installation for two kettles—one 22½ ft. long, 3 ft. wide, and 3 ft. deep, and the other 12 ft. long, 30 in. wide, and 40 in. deep. The gas is raised by compressors from distribution pressure to about 10 lbs. per sq. in. Each side of the kettle is provided with several batteries of burners, under separate control, and adjustable for working rapidly or slowly or merely keeping the bath molten. The mixture of gas and air is directed through the burners into a bed of highly refractory material at the bottom of the heating chamber, and a suitable space from the steel kettle. The mixture penetrates the refractory bed for a certain distance in reaching a zone where the flow-rate equals the combustion-rate for the mixture employed. Within this zone complete combustion takes place; the result being an incandescent bed running the entire length of the kettle on each side. The radiant bed is a very valuable adjunct in the transmission of energy to the work. Because of its refractory nature, its temperature can be made to exceed that of any flame that the furnace walls or the kettle would tolerate without injury. The radiant energy issuing from the refractory material is more readily absorbed by the steel than the heat of the gases within the furnace; and the absence of dull flame and soot causes full benefit to be realized.

Value of Gas for Steel Treating.

The use of gas for all steel treating processes was dealt with by Mr. F. F. Cauley, of the Peoples Gas Light Company of Chicago. He pointed out that not only is the necessary change in steel effected by the application of heat; but the exact nature of this change can be governed only by means of an accurate and absolute control of the heating medium. While the importance of temperature control for the hardening of steel will be generally acknowledged by a factory superintendent, there is a tendency on the part of many people to under-estimate the value of this feature in using gas. A gas salesman should therefore strongly emphasize this point, and explain why accurate control of temperature is impossible with oil or coal.

For coloring purposes, gas is the ideal fuel. The combustion chamber of a gas furnace is smaller than that of a furnace used for other fuel; and on this account a furnace of smaller dimensions can be used for the work. Chemicals used in coloring steel, give off obnoxious fumes; and it is really essential that the fuel employed shall be one that will not add to the discomfort of the operator by emitting additional gases which tend to vitiate the atmosphere. Absolute temperature control must be obtained; and the question of fuel cost is not a factor.

In "Parkerizing" (for automobile equipment) the articles are first rotated in a drum with sand, to obtain a smooth surface. They are then placed in a bath, 2 p.ct. of which is a mixture of phosphoric acid and manganese dioxide. The charge is heated to 210° Fahr. for two or three hours; and as soon as the bubbling ceases the pieces are removed, dipped in oil, and dried. The solution is heated by passing the products of combustion from a gas-flame through a coil of pipe which is immersed in the tank. The construction of the appliance used for this work is such that the most practical way of heating it is by submerged radiation. As other fuels cannot readily be applied, gas has no competitor in this field.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The "L.C.C." Tests of London Gas.

SIR,—In your current issue you reproduce the record from the "L.C.C." testings of the quality of London gas supplied during the recent coal strike, which is not without interest. It will be observed that this Company's results do not indicate the production of "gas of a calorific value of 450 B.Th.U. gross per cubic foot." As a matter of fact, it would have been an utter impossibility to have made it.

The requirement was referred to in scathing language by Mr. Alderman A. J. Hobson, LL.D., J.P., the Pro-Chancellor of the Sheffield University, at the meeting of the "B.C.G.A." held in that city last October.

No comparable instruction was issued to any electric supply undertaking throughout the length and breadth of the land. Nor in the case of any other public utility undertaking was the quality of its service interfered with in any way.

Why was the gas industry alone singled-out for such unfair treatment? Why was it required to injure its business by the enforced selling of an inferior article? Was no protest made by any organization having the necessary knowledge and entrusted with the welfare of the industry?

It would be instructive to have a reply to these questions.

CHARLES CARPENTER,
South Metropolitan Gas Company.

Old Kent Road, S.E.,
Dec. 14, 1920.

Price of Coal-Gas Tar.

SIR,—I am unaware of the source of information upon which the market price of coal-gas tar is quoted from week to week in the "JOURNAL;" but for some time past there has been a feeling on the part of producers that the prices given are unreliable.

I have to-day received striking confirmation that the prices quoted by you for crude tar are absurdly low. The average prices given in the "JOURNAL" for the five weeks ending Dec. 1, based on coal-tar products, are as follows:

Nov. 3, 1920	128s. to 133s. per ton
,, 10, ,, ...	128s. to 133s. per ton
,, 17, ,, ...	128s. to 133s. per ton
,, 24, ,, ...	125s. 6d. to 130s. 6d. per ton
Dec. 1, ,, ...	120s. to 125s. per ton

Taking the highest quotations, the average is 131s. per ton; and for the same period we are to be paid 163s. 6d. per ton for crude coal-gas tar loaded into railway tank-wagons at Derby, based on the market value of products. If we had based this contract on highest "JOURNAL" prices, we should have lost on the tar delivered last month no less than 32s. 6d. per ton, or nearly 25 p.ct. of the true market value of the tar.

J. FERGUSON BELL.

Derby Gas Light and Coke Company,
Dec. 7, 1920.

Mr. Bell's letter was brought to the notice of the gentleman who is responsible for the appearance in the "JOURNAL" of the figures to which exception is taken; and he has forwarded the following reply:

"With regard to Mr. Ferguson Bell's letter respecting tar, I have always pointed out that even before the war it was an exceedingly difficult matter to put one price for tar in the 'JOURNAL,' seeing that geographical position was of such great importance and quality varied so widely. During the war and since, the question of quality and geographical position has become more important than ever. On the question of quality, it is quite possible to-day to have two tars in the same district which will vary by 30s. a ton. On the score of geographical position, it is possible to have tar which, by reason of the carriage on pitch alone, will vary 20s. a ton.

"I have tried to value tar in the 'JOURNAL' consistently; and so long as I do this, it remains a guide to people who wish to make contracts on those figures. Mr. Bell is probably as well aware as anybody in the country of the value of his tar from time to time. This is quite evident by the fact of the price which he refers to as obtaining.

"As to whether or no my prices are fair, I think that the best proof is that, though I only supply one price for tar in the 'JOURNAL,' and do not give a price for tar to any other paper, yet reference to the 'Chemical Trade Journal' will show that they quote tar 105s. to 115s. London, and 105s. to 107s. 6d. North. The 'Gas World' quotes tar 120s. to 130s.; while the 'JOURNAL' quotes 105s. to 115s. London, 107s. 6d. to 117s. 6d. Midlands, and 105s. to 115s. North, whereas had I been asked I should have said that London tar was far more valuable than any tar in the country. My own price for the same week was 117s. 6d. to 122s. 6d. In other words, my maximum price was 5s. above the maximum prices quoted by any of the other 'JOURNAL' correspondents.

"During last week friends of mine were asked to tender for some tar in South Wales; and they secured it at less than £7 a ton, in spite of the fact that, owing to the good market for pitch in Wales, Welsh tar is among the most valuable in the country."

Industrial Gas Heating.

SIR,—As furnace patentees and constructors, we have read with appropriate interest the reports which appeared in the "JOURNAL" for Oct. 27 [pp. 207-9] of the admirable papers read by Mr. S. T. Musgrove and Dr. C. M. Walter respectively, upon the subject of "Industrial Gas Heating." While, however, the figures cited by the gentlemen referred to are not by any means discreditable to gas heating, it is unfortunate that neither Mr. Musgrove nor Dr. Walter seems to have been equipped with the much more impressive data which are certainly now available in respect of town's gas-fired furnaces.

Dealing first with Mr. Musgrove's paper, we note that a furnace

described as of the "F. & A. R." type is mentioned; and though it is not so stated in the report, we believe that the letters used to designate the type stand for "Flue and Air Reversing"—the furnace doubtless being of the reversible regenerative type. Now, we are ourselves the patentees of a reversible regenerative furnace already very well known to the industry and to the engineering trades as the "Revergen;" and it is in respect of this particular furnace that we are able to supply authenticated data of far greater significance than the best figures which Mr. Musgrove appears to have had at his disposal when he delivered his address.

On p. 208 of the "JOURNAL" there appears a table of figures, followed by certain conclusions which Mr. Musgrove considers it justifiable to draw from them. If, however, the interior dimensions of the furnace which is the subject of the table are correctly stated, it is a matter of arithmetic that the area of the internal walls is 40 sq. ft. only, and not 54 sq. ft. as given in the table. As a matter of fact, Mr. Musgrove has adopted 40 sq. ft. as the factor in arriving at the result of 7·2 c.ft. as the rate per square foot necessary to maintain his empty furnace at 900° C. In his other calculation, however, he used 54 sq.ft. as the factor. So that the gas rate per sq. ft. quoted by him of 11·5 c.ft. for maintaining the empty furnace at 1100° C. must be increased to 15·5 c.ft. per sq. ft. which is the correct gas rate for an area of 40 sq. ft. on the consumption figure quoted by Mr. Musgrove.

As against these corrected figures, we are able to quote the following in respect of the Davis "Revergen" furnace:

Starting from Cold.

"Revergen" furnace, 54 in. by 32 in. by 24 in. = 52 sq. feet internal wall area.

Temperature.	Total Gas Consumption per Hour.	Per Sq. Ft. Internal Wall Space—Gas Rate per Hour.	Mr. Musgrove's Gas Rate per Sq. Ft.
900° C.	250 c.ft.	4·8 c.ft.	7·2 c.ft.
1000° "	300 "	5·8 "	Not given
1100° "	370 "	7·2 "	15·2 c.ft.
1200° "	465 "	9·0 "	Not given
1300° "	600 "	11·6 "	Not given

The above figures, which have been confirmed from time to time in actual practice, would obviously have strengthened Mr. Musgrove's case; and we feel sure he would not have been deterred from using them by the mere fact that their publication would have shown that the "F. & A. R." furnace mentioned by him does not by any means exhaust the efficiency possibilities of reversible regeneration.

It may here be appropriately stated that an early model of the Davis "Revergen" furnace was installed for some time in the demonstration room of the gas undertaking with which Mr. Musgrove is associated, as, while the removal of this furnace was insisted upon for reasons which we have never been able to appreciate, the incident furnishes a *prima facie* reason for suggesting that, had we been permitted to conduct a demonstration of the furnace prior to its removal, we should have been able to produce results identical with those we have given above (which were obtained in a precisely similar furnace); and these data would consequently have been available for Mr. Musgrove's use.

Passing now to Dr. Walter's paper, we note that the speaker laid considerable emphasis upon the value of recuperation, which word, as your readers are well aware, is often used as a synonym for regeneration, and for all practical purposes may be taken as representing the same abstract idea. Dr. Walter, however, is somewhat lukewarn concerning recuperative or regenerative furnaces, on the ground that, in the case of this type of apparatus, the period required for heating-up is much longer than in that of more direct-fired furnaces; and for the same reason he discountenances the adoption of regenerative furnaces, except in cases where the furnace is to be run at high temperatures for extended periods. While this view may be warranted to some extent in the case of the ordinary type of regenerative furnace, the introduction by us of the principle of reversible regeneration as applied to town-gas furnaces goes far to invalidate it, because, in the case of our "Revergen" furnace, the economy of the regenerative system begins to manifest itself at the first change-over—*i.e.*, at 750° C., which temperature can be reached in a few minutes in the case of a furnace in daily use, and only slightly less rapidly starting from cold.

It is quite true that, for intermittent use for short periods, the simpler and cheaper types of furnace may be more satisfactory; but it is very doubtful if any furnace user having so little work for his furnace would consider it worth while to pay the higher price for a regenerative furnace, even if the latter offered the same advantage of rapid heating as a less expensive direct-fired apparatus. In any case, it is in continuous operations that the greatest waste is prone to occur, and for which the now highly-perfected reversible regenerative furnace is obviously intended to cater.

On the point of rapid starting-up, however, combined with subsequent efficiency, we should like to state the results obtained from a battery of six small open-fronted "Revergen" forging furnaces, with a working hearth in each case of 24 in. by 21 in. The procedure adopted was as follows: The furnace was raised to 1250° C. A bar, 2 ft. long by 2 in. diameter, was then placed in the furnace, and withdrawn when considered by the foreman smith to be in a suitable condition for drop-stamping, at which time the temperature of the furnace indicated an average of 1400° C., *plus* or *minus*, according to the operator's judgment. The results obtained were:

No. 1 Furnace.—1250° C. reached in 20 minutes from cold start. Bar drawn 50 minutes from cold start. Temperature, 1390° C.

No. 2 Furnace.—1250° C. reached in 13 minutes from cold start. Bar drawn in 36 minutes. Temperature, 1400° C.

No. 3 Furnace.—1250° C. reached in 15 minutes. Bar drawn in 32 minutes. Temperature, 1420° C.

No. 4 Furnace.—1250° C. reached in 21 minutes. Bar drawn in 49 minutes. Temperature, 1400° C.

No. 5 Furnace.—1250° C. reached in 12 minutes. Bar drawn in 39 minutes. Temperature, 1380° C.

No. 6 Furnace.—1250° C. reached in 20 minutes. Bar drawn in 55 minutes. Temperature, 1420° C.

At the same works we also installed a battery of large "Revergen" forging furnaces, each with heating chamber 54 in. by 36 in. by 24 in.; and in the case of these the results were as follows:

No. 7 furnace,		1300° C. reached in	57 min.
" 8 "		1325° C. "	60 "
" 9 "		1310° C. "	60 "
" 10 "	(cold),	1300° C. "	73 "

Furnaces No. 7, 8, and 9 had each been in use the previous day, whereas No. 10 was started from cold.

We think these figures—which, of course, were not available to Dr. Walter when he delivered his address—suffice to indicate that properly designed and soundly constructed reversible regenerative furnaces, at all events, are not unduly slow in heating-up.

With regard to Dr. Walter's general conclusions, we are at one with him in his statement that "the future development of the gas-heated furnace will, to a great extent, depend on more complete recuperation of waste heat." But, as Dr. Walter is probably aware, a very great distance has already been travelled in this direction; and, in our opinion, considerable research and experiment remain to be undertaken before any very appreciable improvement can be made upon the results which we are in a position to demonstrate by means of the "Revergen" system of firing town-gas furnaces. We are also in entire agreement with Dr. Walter that "collaboration between furnace maker and gas supplier is essential for the extension of industrial gas heating." But unfortunately our experience goes to show that furnace makers cannot always rely upon that co-operation from gas undertakings which is admittedly desirable if industrial gas heating is to come into its own, and which co-operation we are ourselves at all times only too eager to manifest.

We fully appreciate that gas undertakings have for years encountered, and are still encountering, very great difficulties. But while this truism may palliate to an extent the apathy which (with certain highly creditable exceptions) we have found to exist in respect of furnace development, it does not fully explain the indifference which we have experienced on the part of some of the largest industrial undertakings towards the "Revergen" furnace, which it is only fair to state represented the first successful application of the reversible regenerative principle to town-gas fired furnaces, and in which, for that reason, apart from the unique construction of the apparatus, we should have expected keener interest to be shown.

It is, therefore, all the more fortunate that the engineering interests, which supply by far the larger number of furnace users, are quick to recognize any and every development which heralds a reduction of heat treatment costs; and while we have been assisted by certain gas undertakings, it is to the former fact chiefly that the present popularity and daily increasing use of the "Revergen" furnace is due.

The Davis Furnace Company,
CYRIL G. DAVIS, Managing Director.

54, *Rathbone Place, W., Dec.* 9, 1920.

Price of Liverpool Gas Increased.—The Liverpool Gas Company announce that owing to further increase in the cost of production the Directors have found it necessary to advance the price of gas by 5d. to 4s. 5d. per 1000 c.ft. to consumers through ordinary meters. This will take effect from the December quarter meter reading. Discount allowed to consumers through prepayment meters will be discontinued on all collections after Jan. 31 next.

Electricity Failures at Belfast.—Owing to heavy fog in Belfast last week, the business of the Ulster Winter Assizes had to be conducted by gas-light. Atmospheric influences were given as a reason for an interruption of the city electricity supply on one evening when all businesses, together with the tramway service and public lighting, were affected; and gas, oil, and candles had to be requisitioned on an extended scale in all parts of the city. Another failure of the electricity supply, which led to a general stoppage for some minutes, was attributed to a communicating wire between two power stations getting out of order.

Proposed Vertical Retorts for Perth.—The Perth Town Council have had before them a proposal to instal vertical retorts at an expenditure of £65,000; and some time ago the Council petitioned the Secretary for Scotland for power to borrow the money required. Recently, however, the ratepayers made representations to have the matter delayed pending its full consideration by the Town Council. The Secretary for Scotland has now sent a letter on the subject to the Council; and it has been remitted to the Convener of the Gas Committee, the Gas Manager, and the Town Clerk to draw-up a statement to be forwarded to the Scottish Office.

Carnoustie's New Gas Plant.—Referring at a meeting last week of Carnoustie Town Council to the installation of new vertical retorts at the gas-works, Provost Nicoll said it was on the 17th of November last year that the Town Council decided to erect a new plant and to adopt the system which the Woodall-Duckham Vertical Retort Company, Ltd., erected. The contract was decided upon and placed in their hands on Dec. 23, and the Company started on the foundations on Feb. 1 last. Notwithstanding all the drawbacks they have had to contend with—such as strikes and other delays in the getting forward of the special ironwork—they were able to have the fires lit in the generator on Oct. 27, and actual making of gas commenced on the 4th inst. He said they could not allow the opportunity to pass without as a Council tendering to the Company their very high appreciation of the manner in which they had carried through the work, and on their being able to keep so closely to their original promise—particularly as the Carnoustie gas-works were in such a condition as demanded practically immediate assistance.

REGISTER OF PATENTS.

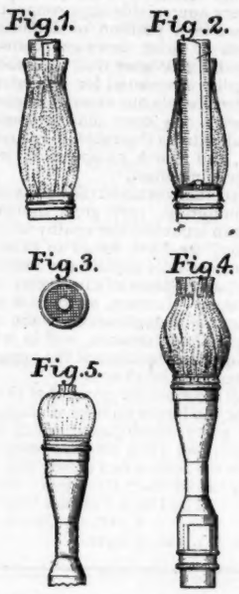
Gas-Lighting Devices.—No. 130,611.

WELSBACH COMPANY, of New Jersey, U.S.A.; Assignees of STITES and E. L. KNOEDLER, of Gloucester, N.J., U.S.A.

No. 18,889; July 30, 1919. Convention date, May 7, 1918.

Heretofore it has always been considered essential, the patentees remark, to support upright mantles from above; but by fastening the lower end of a lamp mantle fabric to a carrier, leaving the upper end free, limp mantles can, it is said, be successfully used on upright burners, allowing the shrinkage during burning-out and shaping to proceed in a downward direction when in place on a burner. "Such a system is successful, particularly where the length of the mantle is less compared with the diameter than in an upright mantle supported from above."

The gas-lighting device according to this invention comprises an upright mantle body composed of limp fabric (impregnated assumedly) adapted to fit the upper end of a bunsen burner, and constituting the sole support for the mantle when in use. The mantle body is incinerated and shaped in place upon the burner, and shrinks downwardly and inwardly—assuming a bulbous form during incineration.



A Welsbach Improved Bunsen.

Fig. 1 is a side elevation of the device, and fig. 2 is a vertical section. Fig. 3 is a top plan view of the burner cap and mantle carrier. Fig. 4 is a side elevation showing the device applied to a bunsen tube before the mantle is burned and shaped. Fig. 5 is a similar view showing the final form of the mantle.

It will be seen that the device comprises a burner cap member adapted to fit readily over the end of a bunsen burner tube. This cap is provided with an internal gauze. The limp mantle is preferably open at both its upper and lower ends; the upper end being provided with a draw-string so as to restrict the opening at the top.

The upper portion of the mantle is also preferably made more inflammable than its remaining portion by treating it with (say) collodion. When the device is applied to an upright bunsen, and lighted at its upper portion, it burns downwardly, thereby burning-out the top portion first. Consequently this portion will not be heavy enough to tip over the less strong mantle body; and the mantle will not tip sidewise while the fabric is being burned-out. [This making of the upper or more inflammable portion is not essential, however, with many forms of mantles and fabrics such as cotton or ramie mantles.] During the incineration or burning-out of the fabric, the mantle will shrink downwardly and inwardly. If it should be tipped sidewise by a draught, vibration, or other cause during the incineration the mantle will shape to a globular form somewhat similar to that shown in fig. 5, when the gas and air mixture is turned on.

In order to keep the mantle from sagging during shipment a temporary internal support is employed—such as a collapsible tube (as shown in figs. 1 and 2) which can be slipped into the mantle in its collapsed form and then allowed to expand so as to hold the meshes of the fabric under some vertical tension. The form of the mantle after removing this internal support is approximately illustrated by fig. 4.

The advantages of the invention are said to result from the "cheapness and simplicity of the device, which for the first time provides as an article of manufacture and sale a limp upright mantle supported solely from its lower part and adapted to an upright burner."

Wood-Gas Producer.—No. 138,362.

AVELLANA, L., of Figueras, Spain.

No. 2718; Jan. 28, 1920. Convention date, Jan. 28, 1919.

This gas producer is on the inverted combustion system. For ignition, the combustion is direct—that is, the air enters through the grate, and the products of combustion escape through the upper part. To this end, the chamber beneath the grate is arranged in combination with a fan for producing the necessary draught for combustion purposes. On the other hand, when the apparatus is working, combustion is inverted—that is, the air enters through the top of the shaft and the products of combustion pass out through the grate. Thus, in the top of the shaft there is arranged an air inlet which communicates with the fan for starting the apparatus, until the suction produced by the motor creates the necessary draught.

The producer is characterized by the conical construction of the shaft in which combustion takes place, and by the fact that the grate is suspended by angle irons beneath the shaft, in such a way that the air can enter not only from underneath the grate but also from the sides. Moreover, the gas produced passes into a chamber below the grate, and thence into a second chamber which surrounds the first one, through which the gas circulates before passing to the purifiers.

Recovery of the Ammonia Gases from Coke-Ovens. No. 153,177.

WHITE, A. E.; a communication from the SOCIÉTÉ FRANCO-BELGE DE FOURS À COKE, of Brussels.

No. 28,326; Nov. 14, 1919.

This invention relating to the recovery of the ammonia contained in coke-oven gases is an improvement in the semi-direct process in which, as generally carried out, the distillation gases coming from the ovens are led into refrigerators, which bring them down to nearly atmospheric temperature and produce condensation of the tarry components and of a portion of the moisture. This latter dissolves a portion of the ammonia and becomes ammoniacal liquor, which with the other condensation products are collected. The gases then pass into a condenser to remove the remainder of the tar, and then through an extractor which delivers them to a saturator containing a hot solution of dilute sulphuric acid. In the presence of the acid the ammonia contained in the gases becomes transformed into sulphate of ammonia in the saturator. The ammoniacal liquor on the other hand is subjected to distillation in the presence of lime in a distilling column, and the ammoniacal gases issuing from this column are also delivered into the saturator where they form sulphate of ammonia. When the concentration of the sulphate in the saturator has become sufficient, the sulphate crystals are ejected mechanically.

The semi-direct process above described has the disadvantage, the patentees say, that the ammoniacal gases issuing from the distilling column carry over a considerable quantity of water vapour and spray, the effect of which is to dilute the solution contained in the saturator to such a point that the crystallization of the sulphate may be prevented.

In order to remedy this disadvantage, it has been proposed to subject the ammoniacal gases issuing from the distilling column to a cooling effect. This method has, however, the disadvantage of increasing the proportion of spray in the gases; and furthermore a portion of the ammonia passes into the condensed water, so that the latter has to be treated over again. This method is therefore not only not efficacious but is expensive. It has also been proposed to heat the mixture of ammoniacal gases and distillation gases and also to heat the constituents of the mixture before it enters the acid bath; and it has further been proposed to heat the mixture of ammonia vapour and steam which leaves the distillation apparatus by the hot products of combustion before introducing the mixture into the saturator.

According to the present invention, the hot ammoniacal vapours extracted from the distilling column are heated by the waste heating gases from the ovens, and are then mixed with the cooled distillation gases which have not been heated. Thereby a mixture of gases is obtained at a temperature most convenient for further treatment—the mixture being thereafter caused to pass into sulphuric acid.

The mixture of the highly-heated ammoniacal gases and the cooled distillation gases when delivered to the saturator conveys a quantity of heat which, added to the heat produced by the exothermic reaction of the ammonia on the sulphuric acid, ensures at any moment the vaporization of the water carried over into the saturator, and consequently the crystallization of the sulphate of ammonia.

Gas-Fired Furnaces.—No. 153,511.

DOWSON AND MASON GAS PLANT COMPANY, LTD., of Manchester, and PATON, J., of Stockport.

No. 4573; Feb. 14, 1920.

The furnace according to this invention comprises a chamber in which are burners projecting through the bottom on one or both sides—the burners being placed along the length of the furnace, and arranged so that zones of different degrees of temperature are produced in the furnace. In or on the side walls are arranged heating-flue openings at intervals for the admission of air, which is preheated in the flues and led to the burners.

The furnace preferably comprises a comparatively long chamber, in the middle portion of which are the burners, the arrangement being such that zones of different degrees of temperature are produced in the furnace—the mid-portion being raised to the desired heat while the waste products of combustion serve to preheat the material being treated at the charging end. The other end of the furnace constitutes a cooling space wherein the temperature of the material or containers is sufficiently lowered to prevent oxidation as they leave the furnace.

Removal of Sulphur from Gases.—No. 153,665.

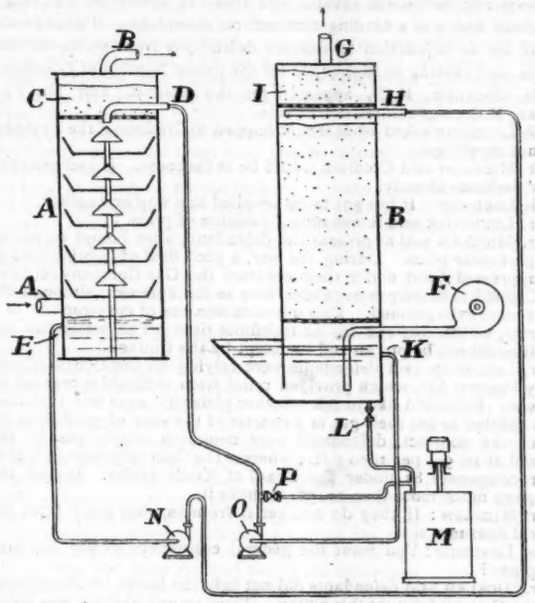
RAMBUSH, N. E., of Stockton-on-Tees.

No. 19,702; Aug. 11, 1919.

This invention consists in a process for removing sulphur from gases, wherein a suspension of ferric oxide in water, or a solution of a salt, is circulated continuously through a sulphiding vessel in which

it meets the gas, and then through a vessel in which it is exposed in distributed condition to the revivifying action of air or oxygen. For satisfactory continuity of the process a portion of the revivified suspension may be withdrawn (periodically or continuously) from the circulation and the precipitated sulphur separated from it by mechanical means—such as fractional subsidence or centrifugal action—whereupon it is returned to the circulation.

The patentee claims to have found that ferric hydrate suspended in a solution of sulphate of iron is a good material for his purpose. It may be used in any suitable apparatus for washing the crude gas, and then passed into a tower which it descends, meeting air passing in the opposite direction. From this tower it may be returned to the washer.



Rambush's Apparatus for the Removal of Sulphur from Gases.

The illustration indicates a suitable apparatus for the purpose. The cold and clean gas to be purified from H_2S is passed at A into an absorption tower, which it leaves at B, having passed through a filter C for removing any spray carried forward by the gas. The suspension enters at D and flows, over distributing cones and discs, to the bottom of the tower, which it leaves at E. The pump N forwards it to the top of a revivifying tower, which it enters at H. This tower at the top has a filter I for removing spray, and at the bottom receives air from a blower F—the air ascending the tower, and leaving at G. The pump O draws the suspension from the tower at the point K and raises it to point D of the absorption tower. A portion of the suspension is (continuously or periodically) removed to the centrifugal separator M by means of a pipe from the extreme bottom of the revivifying tower controlled by the valve, or by means of a pipe from the discharge side of the pump O, controlled by the valve P, or by means of both pipes. In this manner the suspension may be withdrawn from the upper or the lower part, or both parts, of the sump at the bottom of the tower at will. The sulphur having been separated, the oxide material and the solution are returned to the H_2S absorbing system.

A suitable suspension for use in the apparatus consists of a solution of ferrous sulphate containing 5 to 20 grains $FeSO_4.7H_2O$ per litre, in which are suspended from 10 to 40 grams of precipitated hydrated iron oxide per litre.

Incandescent Gas-Mantles.—No. 153,828.

PACE, H., of Hampstead, N.W.

No. 6973; March 8, 1920.

One of the drawbacks and defects of the ordinary gas-mantle is says the patentee, the tenderness and brittleness of the ash remaining after the collodion coating has been burned off. To remedy this by constructing a fabric which, after having been brought into use, shall be capable of resisting ordinary shocks and vibrations, is the purpose and object of the present invention.

To accomplish this, a fabric is woven from ramie thread and "chrysotile" alone or mixed with other threads. The fabric can be woven or otherwise formed into a "stocking" in the usual manner.

The saturating solution is preferably salts of thorium and cerium in proper proportions; and there are several forms of weaving the fabric. First, chrysotile is used for the warp threads and ramie for the woof threads. Secondly, chrysotile and ramie alternately for both the warp and the woof of the fabric. Thirdly, a yarn is composed of chrysotile strands and ramie strands. Fourthly, in the place of the ramie thread in the foregoing combinations artificial silk may be employed. Fifthly, A fabric may be formed of chrysotile threads alone in both the warp and the woof.

The ramie or fibre should be shrunk as much as possible before weaving with the chrysotile; the chrysotile itself being almost unshrinkable, and only very slightly (if at all) affected by heat, or by the acids employed in the manufacture of the mantles.

The chrysotile, being practically indestructible, forms a skeleton or net, to hold the ash of the ramie thread, or fibre; and when heated in the air-gas or bunsen flame of an ordinary incandescent burner, the chrysotile, as well as having absorbed some of the saturating solution —being possessed of illuminating power—adds to the quality and brilliancy of the light.

The patentee states that he is aware that asbestos alone or together with artificial silk, or other material, has been used in the manufacture of incandescent gas-mantles, but is not aware that the form of asbestos known as chrysotile has been so used.

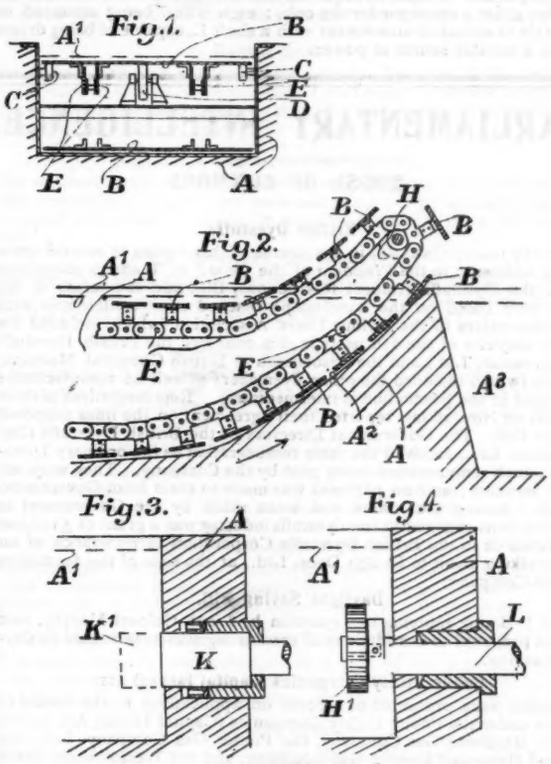
Quenching Hot Coke.—No. 153,838.

R. & J. DEMPSTER, LTD., and BEARD, G. F. H., of Manchester.

No. 9314; March 31, 1920.

This invention, for a method of quenching hot coke from gas-retorts, has for object the accomplishment of the operation without the necessity of an excess quantity of quenching water in actual contact with the coke.

There is presented to the mass of hot coke a comparatively thin film of liquid, forming a part of the total liquid, which film may be in actual contact with a portion of the coke or, in some cases, not in actual contact at all. The film may, in some operations, have a depth as small as $\frac{1}{4}$ inch (approximately). But means may be provided for varying the depth of the film, either wholly or locally, for agitating the surface of the exposed liquid, and for the disposal of the breeze collected in the water container.



Beard's (R. & J. Dempster) Hot-Coke Quencher.

Fig. 1 is a cross section of a water container provided with a form of conveyor for coke, and for enabling a thin quantity of water to be exposed to, or be in contact with, the coke. The container is illustrated with the object of showing a possible application of the invention to a retort-quenching operation in a gas-works, but is not confined to this application. Fig. 2 is a side sectional elevation of a device similar to fig. 1, but specially arranged at one end. Fig. 3 is a sectional elevation on a different scale of a portion of a water or liquid container provided with means for varying the level of the liquid; and fig. 4 is a similar view illustrating means for alternately raising and lowering chain wheels for a conveyor.

In figs. 1 and 2, A are the walls of a container for liquid for quenching purposes—the level being indicated at A^1 therein. B are the plates of a coke conveyor, the uppermost of which is at some slight level below that of the liquid named. In this way, a comparatively thin film of water is provided between the plates and the water level. The plates are supported by revolvable wheels C and D, which are assumed to be repeated at intervals along the length of the container. Also, the plates are shown rigidly attached to the side plates of a roller chain conveyer E, passing round wheels H for receiving the rollers and mounted in the container itself. The periphery of the gear wheel H is indicated by broken lines only. The conveyor and the plates may be arranged to pass in close proximity to the doors of retorts in a retort-house, so that the hot coke (on being discharged) will fall on to the plates.

The patentees remark: It will be seen that the hot coke is not drowned in a large quantity of water, but is only in contact with sufficient water to ensure the quantity of coke above the water level being thoroughly quenched by the water and resulting steam by the time the coke has come to the end of its travel. In this way, the quenching effect is attained largely by steam, and as the temperature of the water film rises during the time that of the coke is falling, the steaming action continues; but when the temperatures are alike, the quenching action automatically stops, practically speaking, without an excess of

water in contact with the coke being necessary or advisable. The natural circulation of heat between the film of water and the remaining water in the container also tends to delay the time at which the two temperatures coincide—added to which the circulation readily brings the film of water down in temperature to a large extent when the quenching action has ceased.

In fig. 2, means are shown for enabling the conveyor and plates mounted thereon to operate as a breeze remover—that is to say, the bottom of the container A is shown with the sloping end-portion A^2 terminating in a well or cavity A^3, and the chain E is assumed to be supported by rollers or the like at its upper portion, the lower portion and plates being allowed to sag down or drag along the bottom of the container as indicated by the arrows. In this way the breeze accumulated at the bottom of the container may be swept along and out into the well A^3, for subsequent removal.

Means for altering the level of the liquid in the container (where different levels are desirable under different circumstances) may be adopted. For example, in fig. 3, a series of plungers K capable of being moved within the walls of the container, may be employed. A plunger moved into position K^1 is shown by broken lines; and it is obvious that the displacement of the water produced will affect the level at A^1. Other means, however, may be adopted—for example, air-tight casings or bags of flexible material could be substituted for the plungers at K^1, the inflation of the castings with air or fluid under pressure bringing about the result desired. In other cases, where a varying depth film of water is required, chain wheels H^1 may be used (as in fig. 4) for a conveyor for the coke; each wheel being mounted on an axle in eccentric attachment with a shaft L, capable of being driven from a suitable source of power.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

British Dyestuffs.

Sir P. LLOYD-GREAME, in the course of his replies to several questions addressed to the President of the Board of Trade in connection with the Dyestuffs (Import Restrictions) Bill, said the terms of the Bill were based on the conclusions reached after conferences with representatives of the Colour Users' Association (which included the great majority of the dye users in this country), the British Dyestuffs Corporation, Ltd., and the Association of British Chemical Manufacturers (which included the other dyemakers as well as manufacturers engaged in the production of intermediates). Representatives of these bodies on Nov. 26 last reported their agreement on the lines proposed in the Bill. The Government Directors of the British Dyestuffs Corporation, Ltd., received the same remuneration as the ordinary Directors; such remuneration being paid by the Company. They were not civil servants; and no payment was made to them from Government funds. Among the grants and loans made by the Government to several firms engaged in the dyestuffs industry was a grant of £100,000 for research to the British Dyestuffs Corporation in pursuance of an undertaking given to British Dyes, Ltd., at the time of the formation of the Company.

Daylight Saving Bill.

Sir J. BAIRD, replying to a question by Lieut.-Colonel Murray, said it was proposed to introduce next session legislation in regard to daylight saving.

Public Utility Companies (Capital Issues) Act.

Copies were presented of reports on applications to the Board of Trade under the Public Utility Companies (Capital Issues) Act, by the North Middlesex Gas Company, the Pinner Gas Company, Ltd., the Hemel Hempsted District Gas Company, and the Weston-super-Mare Gas Light Company.

Glasgow Corporation Provisional Order.

Application is to be made to the Secretary for Scotland, by the Glasgow Corporation, for a Provisional Order for various purposes. They will ask for authority to borrow further money for gas-works purposes; to make provision for sinking fund repayments; and to remove the obligation upon the Corporation to appoint a Treasurer.

Gas-Workers' Threat to Hand-in Notices.—At a meeting of the Bolton gas-workers last Thursday it was decided to tender seven days' notice to cease work unless there is a reply to the demand of an all-round advance of 6s. The towns involved are Bolton, Bury, Farnworth, Leigh, Atherton, Radcliffe, and Mosley.

Increased Demand at Stockton.—At a meeting of the Stockton Town Council on Tuesday of last week Alderman Sir John Harrison said, in reference to gas complaints, that the demand upon the works had been heavier than it was possible to supply with two beds of retorts undergoing repair. As compared with a year ago, the demand had increased by 26 p.ct.

Chesterfield Water-Gas Plant.—It was stated by Alderman G. Clark (the Chairman of the Gas Committee), at a meeting of Chesterfield Town Council, that in 1896 the gas consumption was 58 million c.ft., and the revenue was £12,800; whereas last year the consumption was 243 million c.ft., and the revenue was £67,507. The carbonizing capacity of the works was 1,200,000 c.ft. per day, and the greatest output for one day had reached 1,100,000 c.ft. He said that a water-gas plant was now being installed, which would increase the output by 400,000 to 500,000 c.ft. per day; and coke-oven gas was also being taken, which would augment the supply to the Grassmoor and Hasland districts by 30,000,000 c.ft. per annum. There had already been installed a sulphate of ammonia plant, new boilers, coke-handling plant, &c.; and altogether he asserted that the Chesterfield Gas-Works were in very good condition.

LEGAL INTELLIGENCE.

A PUBLIC LIGHTING CONTRACT QUESTION.

Crediton Urban District Council v. Crediton Gas Company.

In the Chancery Division of the High Court of Justice, on Thursday last, Mr. Justice Astbury heard an action in which the Crediton Urban District Council claimed a declaration that a notice given by the Gas Company to terminate an agreement relating to the supply of gas to the public lamps was invalid, and that the agreement was still in existence and was a binding contract on defendants. Plaintiffs also asked for an injunction to restrain defendants from acting on their notice, and ceasing to supply gas for the public lighting of Crediton.

Mr. MICKLEM, K.C., appeared for the plaintiffs, and Mr. LUXMOORE, K.C., represented defendants.

His LORDSHIP asked what would happen to Crediton if the Company did not supply gas.

Mr. MICKLEM said Crediton would be in darkness. It had had three days' darkness already.

His LORDSHIP: It has got to be supplied one way or another.

Mr. LUXMOORE said it was only a question of price.

Mr. MICKLEM said at present the defendants were bound to supply at a particular price. During the war, a good deal of lighting had to be suppressed; and under their contract the Gas Company required the Council to make payment according to the contract, although the lights were extinguished. This question was one of construction of a contract, which was one for an indefinite time. The contention was that it could not be put an end to except by the Council.

Mr. LUXMOORE said defendants were relying on the Courts (Emergency Powers) Act, which provided relief from difficulties created by the war. He would like to ask whether plaintiffs' case was that they were entitled to get their gas at a quarter of the cost of producing it? Under the contract, defendants were bound to supply gas to the Council at 1s. 9d. per 1000 c.ft.; whereas the Company were charging other consumers 8s. under the Board of Trade Order. It cost the Company much more than 1s. 9d. to make it.

Mr. MICKLEM: If they do not get it from us, they get it from the general consumers.

His LORDSHIP: You want the general consumers to pay for your cheap gas?

Mr. MICKLEM said defendants did not light the lamps for three days; and the Council brought this action. Then an undertaking was given until the trial of the action not to act upon the notice the Company had given.

His LORDSHIP: It is plain this place must be lighted.

Mr. LUXMOORE said he was prepared to make any fair terms.

His LORDSHIP: Do you say, independently of the Courts (Emergency Powers) Act, that you are entitled at once to put an end to the contract?

Mr. LUXMOORE thought the Act was his best point.

The case was adjourned in order that defendants might take out a summons asking for the benefit of the Act; his Lordship suggesting that the parties would be very wise if they came to a settlement. It was obvious, having regard to the rise in the cost of coal and wages, that defendants could not possibly produce gas at the price mentioned in the contract. Therefore the parties would be well advised in coming to a fresh arrangement.

Erection of a Gas-Producer.

At the Birmingham Assizes, on Friday and Saturday, there was heard an action brought by David Arkinstall, trading as Arkinstall Bros., galvanizers and iron-plate workers, of Birmingham, against C. F. Price & Co., furnace builders, to recover £473 in respect of a contract for the construction and erection of a gas-producer for the heating of a tank. The plaintiff's case was that in April last the defendants agreed to construct and erect a gas-producer, together with fittings, for the sum of £350; the undertaking given being that the work should be completed within 21 days. The plaintiff paid £280 on account of the contract. Defendants, between May 22 and June 15, failed to make the gas-producer reasonably efficient. The defence was that there was no agreement to complete the contract within the 21 days, and a denial that the producer failed to heat or work the tank. A counter-claim was filed for £141 in respect of additions and alterations not comprised in the original plans. Judgment for the plaintiff for £280 was given by Mr. Justice Rowlatt; and the counter-claim was dismissed. It transpired that the action arose from an experiment in substituting gas for other fuel for heating galvanizing tanks.

Bradford Rebate.—Mr. Charles Wood (Engineer and Manager) reported to the Bradford Gas Committee recently that, after payment of the rebate of 10d. per 1000 c.ft. to domestic consumers, made in pursuance of the direction of the Board of Trade dated Nov. 28, 1919, there was still a balance which would enable a further rebate to be made at the rate of 1½d. per 1000 c.ft. The Committee authorized the City Treasurer to make such rebate to domestic consumers on the gas used during the half year ended June 30, 1920.

Doncaster Gas Matters.—On Tuesday night of last week, at a meeting of the Doncaster Town Council, the Watch Committee reported that they had had under consideration alternative schemes for lighting by gas or electricity the main streets of the town, and they had decided not to take any further action in the matter for the present. The Gas Committee recommended that the price of coke be increased by 4s. per ton; but, on the proposition of the Mayor, this was referred back for reconsideration. The Mayor stated that, owing to the industrial position and increasing slackness of trade, they were getting a large stock of coke on hand.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices appear in the "London Gazette" of applications by gas undertakings to the Board of Trade under section 1 of the Gas Regulation Act for Orders providing for—(*a*) The repeal of any enactments or other provisions requiring the undertakers to supply gas of any particular illuminating [or calorific] value, and the substitution therefor of power to charge for thermal units supplied in the form of gas; and (*b*) the modification of the statutory or other provisions affecting the charges which may be made by the undertakers by substituting for the maximum [or standard] price per 1000 c.ft. now authorized, with an addition to meet increases in the costs and charges of, and incidental to, the production and supply of gas by the undertakers since June 30, 1914, a maximum [or standard] price per therm (100,000 B.Th.U.).

A copy of the applications made to the Board of Trade, and of all the documents submitted therewith, may be inspected, free of charge, at the gas offices concerned.

Any local authority or person desiring to make representations with regard to the application may do so by letter addressed to the Assistant Secretary, "Power, Transport, and Economic Department," Board of Trade, Great George Street, S.W., and posted not later than the date specified in the notice.

Bishop's Stortford, Harlow, and Epping Gas and Electricity Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. per 1000 c.ft. within the urban district of Bishop's Stortford and so much of the limits of supply (as set forth in the first schedule of the Bishop's Stortford, Harlow, and Epping Gas and Electricity Act, 1910) as lie within 1 mile of that urban district or within a radius of 2½ miles from the gas-works at Harlow, or within a radius of 3 miles from the gas-works at Epping, or within a radius of 1½ miles from the gas-works at Ongar, all of which part of the limits are called the inner area. The undertakers are also authorized to charge in the portions of the limits of supply called the outer area a price not exceeding the price charged in the inner area by more than 1s. per 1000 c.ft., subject to a provision under which the price that they may charge within 1½ miles of the Ongar gas-works is a price less by 2d. per 1000 c.ft. than the price charged within the inner area.

The standard price which the undertakers have asked the Board of Trade to substitute for the standard price of 4s. per 1000 c.ft. is 1s. 9d. per therm for the inner area and for the outer area a price not exceeding the price charged in the inner area by more than 5¼d. per therm, and within 1½ miles of the Ongar gas-works a price not exceeding a price less by ½d. per therm than the price charged within the inner area.

Brighton and Hove General Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is:

(1) 3s. 2d. per 1000 c.ft. within the parishes of Brighton, Hove, Preston, and Aldrington as existing at the time of the passing of the Brighton and Hove Gas Act, 1910, and therein described as "the inner area." They also have power to charge in other parts of their area of supply prices per 1000 c.ft. exceeding the price charged in the inner area by amounts not exceeding the following:

(2) In the parishes of Portslade-by-Sea and New Shoreham and such parts of the parishes of Southwick, Kingston-by-Sea, and Old Shoreham as lie to the south of the upper road leading from Brighton to Old Shoreham, 3d. per 1000 c.ft.

(3) In the parishes of Portslade and Patcham and such parts of the parishes of Southwick and Kingston-by-Sea as lie to the north of the said upper road, and so much of the parish of Rottingdean as lies to the west of an imaginary line drawn from the chimney of the ventilating shaft of the Brighton Intercepting and Outfall Sewers Board at Roedean to the tower of the parish church at Ovingdean, 6d. per 1000 c.ft.

(4) In the parishes of Lancing and Ovingdean and in the remainder of the parishes of Old Shoreham and Rottingdean, 1s. per 1000 c.ft.

(5) In any other parish or place within the limits of supply, 1s. 3d. per 1000 c.ft.

The prices which the undertakers have asked the Board of Trade to substitute for these are:

1s. 6d. per therm within the inner area, with a power to charge in other parts of the area of supply prices per therm exceeding the prices charged in the inner area by amounts not exceeding the following:

In the parishes of Portslade-by-Sea and New Shoreham, and such parts of the parishes of Southwick, Kingston-by-Sea, and Old Shoreham mentioned in paragraph (2), 1·421d. per therm.

In the parishes of Portslade and Patcham, and such parts of the parishes of Southwick and Kingston-by-Sea mentioned in paragraph (3), and so much of the parish of Rottingdean as mentioned in that paragraph, 2·842d. per therm.

In the parishes of Lancing and Ovingdean, and in the remainder of the parishes of Old Shoreham and Rottingdean, 5 684d. per therm.

In any other parish or place within the limits of supply, 7·105d. per therm.

Broadstairs Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. 4d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 10d. per therm.

Cromer Gas Company.

The standard prices now authorized in respect of the supply of gas by the undertakers is 4s. 6d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute is 1s. 10d. per therm.

Deal and Walmer Gas and Electricity Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 3s. 3d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute is 1s. 6d. per therm.

Derby Gas Light and Coke Company.

The standard prices now authorized in respect of the supply of gas by the undertakers are 2s. 10d. per 1000 c.ft. in the borough of Derby, and 3s. 2d. per 1000 c.ft. in the remainder of the limits of supply; and the prices which they have asked the Board of Trade to substitute for these are 14·6d. per therm and 15·4d. per therm respectively.

The present sliding-scale is subject to a neutral zone of 3d.; and the standard rate of dividend is not diminished unless the price per 1000 c.ft. charged by the undertakers exceeds 3s. 1d. in the borough of Derby and 3s. 5d. in the remainder of the limits of supply. They have asked the Board of Trade to substitute for these prices the prices of 15·2d. per therm and 16d. per therm respectively.

The undertakers are empowered to charge for the hire of meter and fittings in connection with prepayment meter supplies a price for the gas supplied exceeding by 1od. per 1000 c.ft. the current price for gas supplied through an ordinary meter. They have asked the Board of Trade to substitute for this the sum of 2·8d. per therm.

East Cowes Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. 7d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 6·6d. per therm.

Havant Gas.

The Havant Gas Company are applying to the Board of Trade for a Special Order to authorize the increase of the Company's share capital by £2000 to £24,000, and the increase of the loan capital to £12,000, including moneys already borrowed.

Highbridge Gas Company, Limited.

The standard price now authorized in respect of the supply of gas by the undertakers is 3s. 9d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 8d. per therm.

North Middlesex Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 3d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute is 1s. 5d. per therm.

Solihull Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. 6d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 8d. per therm.

Southgate and District Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 6½d. per therm.

Wakefield Gas Light Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 3s. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute is 1s. 4⅝d. per therm.

Waltham Abbey and Cheshunt Gas and Coke Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 8d. per therm.

Woolton Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 11d. per therm.

York Town and Blackwater Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 3d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute is 1s. 7d. per therm.

THE GAS INDUSTRY AND RAILWAY RATES.

The Evidence of Mr. S. S. Ogilvie.

In the "JOURNAL" for the 1st inst. [p. 529], there was given a summary of the evidence tendered by Mr. S. S. Ogilvie (Assistant Manager of the National Gas Council) to the Railway Rates Advisory Committee; and from the official minutes of proceedings, it is now possible to amplify this. Mr. Ogilvie's evidence was heard on Nov. 25, which was the thirty-fifth day of the Committee's sittings. Mr. F. Gore-Browne, K.C., is the Chairman of the Committee, the other members of which are Sir Walter W. Berry, K.B.E., Mr. W. A. Jepson, and Mr. L. A. Martin.

Mr. *Ogilvie*, examined by Mr. JACQUES ABADY, stated that the National Gas Council was an Association which represented 94 p.ct. of the total make of gas in the United Kingdom. There was a sum of £150,000,000 invested in the gas industry, which employed 100,000 workers at about 1600 gas-works. Practically every gas-works was situated on a railway.

The gas industry was the second largest consumer of coal in England; and it was of vital importance that the carriage of coal and the industry's bye-products should be done at as low a rate as possible. Any undue cost for the carriage of coal must increase the cost of gas, which, in addition to domestic use, was employed by about 3000

trades. In view of these considerations, the National Gas Council was of opinion that coal, coke, and patent fuel should be put in a classification bearing the lowest possible rate—a special classification lower than others. The matter immediately affected not only the gas industry, but those industrial trades the motive power of which was gas. The Council also held the view that continuous mileage should be adopted in all cases by railway companies.

The CHAIRMAN: Would the Council be content that the rates should be increased to a certain extent to make up to the companies the loss they suffered by adopting continuous mileage?

Witness: Subject to the rate on coal, coke, and patent fuel, it might be necessary to have a slightly increased rate.

It must include coal if the continuous mileage is to be extended to coal?—It was hoped it would not be.

Mr. JEPSON: Do you mean that it would not be extended to coal?

Witness: That the increased rate would not be extended.

Is somebody else to pay the companies the revenue they lose by adopting continuous mileage for coal rates?—I am afraid I am not in a position to say that. It is for the Committee.

Witness added that the Birmingham Gas Department were of opinion that continuous mileage would effect simplification, so as to enable the checking of railway companies' accounts, in further connection with which latter the Corporation considered that the amount chargeable in respect of the use of railway companies' wagons should be stated separately from the rate for the conveyance of what is in the wagons.

Mr. JEPSON: That is always done to-day, is it not, with regard to coal, except on the North-Eastern system? You want owner's wagon rates, with a separate charge where the wagons are used. That is the point, is it not?

Mr. ABADY: We want the amounts shown separately, as they are to-day, except on the North-Eastern and the Scottish lines.

Under continued examination, witness stated that a question affecting short-distance rates had been brought forward by the Highbridge Gas Company, who, owing to the interim revision of rates, had to pay two flat-rate additions (one on either side of the Bristol Channel) on coal brought across from South Wales. The Council were anxious that the number of flat-rate additions should be abandoned when permanent rates were fixed.

There had been many complaints with respect to the incidence of the minimum distance charge. The Coventry Gas Department had complained that most of the local sales of coal passed by rail to a wharf about two miles from the Corporation sidings, and in one or two cases to a siding within a few yards of them. The pre-war rate was 8½d. per ton in owner's wagons, and the new rate 1s. 11d. per ton. The Council considered such a rate, effected by the flat addition, utterly uncommercial.

The Stirling Gas Company had given an example of a haulage of 600 yards in one case, and of 300 yards in another case. Here the charge was 6d. per ton for the 600 yards; while for the 300-yard haulage the railway proposed to charge 9d. per ton. This was obviously a flat-rate addition on a minimum distance charge, and apart from the proposals of the railway companies that the minimum flat-rate charge should be based on ten miles—a proposal which would increase the charge over and above what the Company were now paying.

In the case of the Felixstowe Gas Company, their works were about a mile from the docks; and they used sea-borne coal, loaded from the ship into trucks and railed to the works. The charges were 2s. 3d. per ton in owner's wagons, and 2s. 10d. in railway companies' wagons. The railway, being in a position to make this high charge, prevented sea-borne coal from competing with rail-borne coal; and the Council desired to preserve such competition.

The Hartlepool Gas Company wished to draw the attention of the Committee to the fact that they were charged rates varying from 1s. to 1s. 9d. per ton for pushing wagons and tanks over the level-crossing on to the private sidings—a charge (which had previously been 6d. per ton) levied by the railway company. Again, the Eastbourne Gas Company had drawn attention to the great increase that had taken place since the last revision. This made the rate at present charged absolutely uncommercial. The distance from the ships alongside at Newhaven to the Company's siding was a mile; and the charge had been increased from 2s. 6d. to 5s. per wagon. In January last coal dues were 8d.; discharging, 1s. 10d.; rail to Eastbourne, 2s. 11d.; train to works, 5d.—total, 5s. 10d. Now, this total cost of getting coal *ex* ship to the works had increased to 12s. 6d. The Secretary of the Company had protested to the Goods Manager of the London, Brighton, and South Coast Railway, who had expressed his willingness to meet the Company; but apparently, by reason of the increases which had been ordered, including the flat-rate charges, he (the Good s Manager) was of opinion he had no option but to charge the increases. It was a very heavy impost, and emphasized the point about the flat-rate charge. The Southern companies already paid 60s. to 61s. a ton for their coals, and were very severely hit.

A letter from the Macclesfield Corporation gas-works dealt with rather a different point—that by reason of allocation of a particular line, they had to pay 1s. per ton extra, although the line they chose was more convenient. The main goods siding in the town was nominally the Great Central Railways, managed by a Joint Committee of the Great Central and the North Staffordshire Railways. Tar tanks, &c., coming from the Yorkshire district or Manchester were sent on the Great Central lines to Macclesfield, transferred from the Joint Committee's siding to the North Staffordshire's own sidings, and loaded by a pipe-line from the works. The Railway Company charged 1s. a ton for shunting. Prior to the war, gas-oil coming from Manchester travelled by the London and North Western and North Staffordshire joint lines direct to the siding, where it was unloaded. Now it travelled *via* the Great Central from Manchester; and the 1s. per ton had to be paid for taking the wagons round to the North Staffordshire sidings. This extra shunting was due to the arrangements made by the railway companies, whereby the route had been changed. The average increase in the cost of coal at the Macclesfield works, owing to the increased rail-rates, was 3s. per ton.

Mr. JEPSON: That is yet another case of the unfair working of allocation.

Mr. BRUCE THOMAS (for the Railway Companies' Association): Yes. I understand these are all matters the railway companies are ready to look into.

Mr. ABADY: The Eastbourne case rather indicated that the railway companies are perfectly willing to look at this from a commercial point of view; but it does show the artificiality of trying to apply general rules to short distance traffic and similar matters.

Mr. JEPSON: I suppose your point is through your witnesses to suggest that the railway companies should have some freedom of action and, in cases like yours, be in a position to make a bargain.

Mr. ABADY: That is so. Since you have raised the point, it is only right I should say that I am going to argue to the Committee that the application of the working scale which you try to introduce for ordinary haulage for normal traffic is totally inapplicable to the special circumstances of short-distance and internal and domestic traffic, &c. I want to get this kind of instance before the Committee, so as to lay the foundation for my argument.

The witness then briefly referred to a complaint from Ryde, where the charge for a 300-yard haul had risen from 3d. to 1s. per ton, excluding what would be the effect of the 10-miles short-distance minimum; and he spoke to numerous complaints received by the Council, grouping themselves round the vexed question of private sidings.

Mr. JEPSON: You have objected to the flat-rate. If the companies, as apparently they have, have made a case for something more for short distances, have your Association considered how far they would be prepared to agree that the short-distance mileage should be increased—say, from 3 miles and 4½ miles, up to 6 miles or 7 miles, if they get rid of the flat-rate?

Witness: The National Gas Council suggest that it should not be altered beyond 3 miles.

You want the three miles preserved?—Well, no further extension of that.

You want to get rid of the flat-rate, and keep 3, 4½, or 6 miles?—The three miles.

Whatever the present limit is, and not pay any more at all?—No, not on the short hauls.

Generally speaking, the evidence continued, gas undertakings were satisfied with the rates paid before the war on short-distance hauls, and were willing for these charges to bear the percentage increase due to increased cost; but they did not want the basis altered.

With reference to the services rendered to private sidings, the Council asked that it should be made quite plain what was included in the conveyance rate; that the conveyance rate should be charged from one point on the line to the other; and that payment should be made for services or accommodation rendered before or after the conveyance rate came into operation. This would differ from the present law in that, regarding private sidings, a station-to-station rate was now generally to be paid. This station-to-station rate was disintegrated, and a rebate obtainable if the services rendered at the private siding were not of equal value to the terminals. But, witness pointed out, a large number of the gas undertakings concerned were small, although they might have their private sidings; and it was placing them in an unfair position to throw upon them the onus of proving themselves entitled to the rebate. Actually, the station-to-station rate was not applicable; and it was submitted that, in the case of many gas companies, no extra services whatever were rendered, apart from the conveyance rate. On coal, the only terminal was the station terminal; but there were other things—such as steel, timber, &c.

Mr. JEPSON: Generally speaking, on coal the rates are to the siding. If there was a station anywhere near, you would find that the siding rate was below the station rate by 2d. a ton?

Witness: That I could not say. Generally speaking, the siding rate is lower than the station rate.

For coal, because you get rates quoted for coal to particular sidings?—That is so; but I could not say if it was usually lower or not.

You mentioned the Birmingham Corporation. You know the Birmingham Corporation had a case before the Railway Commissioners, where they claimed something less than the station rate at Saltley; and after going into the whole case the Commissioners judged that the station rate was a fair rate to charge to the Saltley gas-sidings?—I do not know the full details of the case; but no doubt you do. I understand, however, that Mr. Justice Lawrence said another charge at the private sidings was unjustified to the amount of 1d. per ton when the rates were disintegrated.

Mr. ABADY: I think what you say applied to the case of the Midland Company, where the Birmingham Corporation did not succeed; but in the case of the London and North Western a rebate was ordered. I think you will find that is so. But it is a matter of record. It is not a question for anybody to give evidence about; and I do not think it matters twopence-halfpenny what the position was. It does not affect the principle. It is clear, I think, that coal is going to be treated exceptionally, as it has been in the past, and that siding rates are going to be charged?

Witness: Yes.

Regarding other materials that pass in and out of gas-works, attention was next called to a matter brought forward by the Ossett Corporation Gas-Works, whose engineer "wished to draw attention to the point that the railway company, where they grant a special rate to private sidings, do not make this special rate known. Consequently, anyone sending goods from a distance pays the station rate; and the railway company get what they are not entitled to at our expense." There were a large number of such cases, where goods were consigned to the owner of a private siding at rates which included carriage. The owner was not immediately concerned in such a case to go to the tribunal and ask for a rebate, and the consignor, not being interested in the private owner's business, simply paid the carriage and reckoned the payment in the charge he made for the goods. So that, in such circumstances—the railway companies having the right to charge *prima facie* the station-to-station rate—it was not true to say any unfairness could be redressed by the siding owner, because in many cases he was not the person who paid the carriage. If he had any special agreement with the railway company, he would never know what rates were being paid, or whether or not he was entitled to a rebate.

Another point was raised by the Oldham Corporation, dealing with

the special allowance of exceptional rates to siding owners. They complained that they had to pay the station rate, and that, when applying for rebate, the railway said they were not entitled to any, because the station rates were, in fact, exceptional, and constituted an allowance in being below the maximum. The Edinburgh Corporation had made a complaint similar to Felixstowe's with respect to the shipment rates. They also drew attention to their view that a pure conveyance scale should apply, and that in the classification of rates special allowance should be made to such works as carry out their own shunting, and receive consignments in full truck-loads. Where classification was based on truck-loads, allowance should be made for traffic handled in such quantities as to ensure ease and economy. The Coventry Corporation had raised a similar point.

In the matter of dangerous goods, gas-works were interested as makers and consignors of benzole. The National Gas Council agreed generally with the evidence to be brought forward by the Association of Chemical Manufacturers. In connection with samples of crude benzole, the Bridlington Gas Company wrote: "The fact that a railway company can make a minimum charge of 8s. for a few ounces sent as a sample is a factor which interferes with business." They asked, therefore, that the discretion of railway companies to refuse dangerous goods under section 105 of the Railway Clauses Act should be done away with or curtailed, so as to make it impossible for them to impose such a condition on a consignment of this nature.

The CHAIRMAN: How does 8s. on a small parcel arise? Is it because they put as a special condition that this shall be the minimum charge?

Mr. ABADY: It is a proposal in the classification, I think.

The CHAIRMAN: I see there is a minimum.

Mr. ABADY: No doubt that is the reason. The principle to be attacked is the discretion of the railway companies, as against leaving the actual rate to be charged to the judgment of an independent tribunal.

Mr. BRUCE THOMAS: This 8s. has the recent addition in it. I am told it used to be 3s. 6d.

Mr. ABADY: There is another case which also includes the recent addition. That is the question of sulphuric acid, which is a corrosive article. I do not think it can be called dangerous. That is raised by the Ryde Gas Company. The example they call attention to is that the freight on carboys of sulphuric acid in 1914—that is to say, on Jan. 14, 1914—cost £2 6s. 8d., and that in consequence of the last increase it now costs £7 2s. 7d.?

Witness: That is it.

They suggest that this is an uncommercial increase?—Entirely.

The CHAIRMAN: It is treble.

Mr. ABADY: The figures are these. The cost from Gosport to Ryde in 1914 was £2 6s. 1d., and empties were free. Now the cost from Gosport to Ryde is £7 19s. 8d.; and the empties were £1 9s. 7d. This makes £9 9s. 3d.; and the difference is £7.

The CHAIRMAN: Why did the ordinary rate go up three times?

Mr. ABADY: I do not know how the rate has gone up from £2 6s. 8d. to £7 19s. 8d.

Mr. JEPSON: Is Gosport to Ryde a railway company's charge? I should have thought that the stuff would not be carried on the railway company's steamers. It sounds like a cargo boat which is not controlled, and not under the directions of the Ministry of Transport. I doubt whether the railway company would carry these dangerous goods on their passenger boats.

Mr. ABADY: The final point to which the Council wish to direct the Committee's attention is the question of demurrage. They have had letters from several gas undertakings which complain of the treatment they have received from the railway companies with respect to demurrage on their own wagons. Whatever rule is applied whereby the gas undertaking or other bodies should pay demurrage to the railway companies, that rule should apply *vice versa*?

Witness: That is so. I think that sums it up.

Mr. *Ogilvie* was then cross examined by Mr. BRUCE THOMAS, who, as stated above, appeared for the Railway Companies' Association. Reference was first made to the suggestion for amending section 105 of the Railway Clauses Act; and witness confirmed that the Bridlington Gas Company desired that the power of imposing such a minimum charge on dangerous goods like benzole, and of deciding what were dangerous goods, should be taken from the hands of the railway companies. Regarding the first point, it was open to a trader to-day to go to any Court of Law and get them to say that some specific minimum charge was unreasonable; but it was an extremely expensive matter for a small gas undertaking. The position should be rectified, whether by amending section 105 of the Railway Clauses Act or not. Under Part 4 of the Rates and Charges Orders, a railway company was only entitled to charge a reasonable sum for carriage on any articles coming within Part 4; and any trader could question a minimum charge in a Court of Law. But the gas industry thought it should be questioned, and the rate fixed by an impartial tribunal. The County Court was impartial, but too expensive.

The CHAIRMAN queried whether any tribunal would be less expensive than a County Court hearing; and he suggested the possibility of a refusal to pay (say) 8s. on a little benzole as a challenge to the railway company. If the latter took proceedings, only trifling costs would be charged against the undertaking even if it lost the case.

Witness objected that only the one case would thus be settled, and every particular case would need to be fought.

The CHAIRMAN held that such a finding would be a precedent for any other County Court judge, and would preclude a railway company's again insisting on such a charge.

Witness: I am not at all certain of that.

The CHAIRMAN: You would take care it was reported, of course?

Witness: If that happened to a small undertaking in the North of England, it would not be known.

The CHAIRMAN: Let a big gas company do it, and take care the report was put in the "GAS JOURNAL."

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King's Bench Division at a cost of £30 or £40, witness submitted that in practice it would mean that every undertaking would have to fight the particular rates with the railway company. Perhaps a railway company would not attempt to send in an account for charges which had been held to be unreasonable; but a railway company, once a condition had been held unreasonable, started another.

The complaint of the Ossett Corporation Gas-Works, concerning the payment of carriage by the consignor and the claim for a rebate by the siding owner, was then referred to. The National Gas Council did not know what were the services performed by the railway company in connection with the Ossett Gas-Works private sidings; but such services were unlikely to be as valuable as those obtained by a station trader. Ossett was entitled to a rebate, which did not reach them.

Mr. Bruce Thomas: I think I am correct in stating that it has been held that a person can claim a rebate although he does not pay the carriage charges directly to the railway company. Where he buys goods carriage paid, he is in effect paying the carriage charges; and he is not precluded from claiming a rebate merely because he does not hand the money direct to the railway company. There have been cases of that nature. The Ossett Gas Company having got their rebate question settled, I should have thought they might have obtained a return if they are entitled to it.

The Chairman: That would be so, would it not? The Ossett Gas Company order 1000 tons of goods from somebody at a distance, which are delivered to them carriage paid. They take the evidence of that to the railway company and say: "You see, our friends deliver these goods to us and pay the full carriage. Will you let us have the rebate?" The railway company would have no answer.

Mr. Abady agreed, but said they preferred to take it. On consignments of one ton, the Company were not particularly interested—had not the time, and did not take the trouble. He suggested it was that circumstance—that a large quantity of the goods sent to private sidings was carriage paid by somebody who was not concerned in going before a tribunal to get their station-to-station rate reduced—that accounted for the evidence that a large percentage of sidings pay station-to-station rate The station-to-station rate being in effect paid by the consignor, the siding-owner was concerned, and could collect the rebate provided that he had made an agreement. It was a case parallel to that of the grievance over dangerous goods—the business man could go to law; he could spend time getting an agreement over a point not relatively serious.

The Chairman: You are asking us to set up a tribunal and give a right of appeal to the tribunal. If he has got to do it in some form or another, it does not matter which.

Mr. Abady: We are asking you not to set up a system of rating which will *prima facie* force everybody to go to a tribunal, whether he likes it or not. None of the traders, if I may say so with all the force at my command, think that the proposal—that a sum should be charged and that the trader has the right to displace it by going to a tribunal—is a commercial proposition.

The Chairman: I do not think any of the traders have taken the trouble to understand the railway companies' proposition.

Mr. Bruce Thomas: There are one or two matters which the witness spoke about, with regard to continuous mileage, as to which I might have asked a question.

The Chairman: We have that question well before us; we know your view upon it.

Mr. Bruce Thomas: This witness apparently puts forward a new proposal—that continuous mileage should be applied to coal, but that coal should not bear the burden that will be cast on traffic generally by the adoption of this principle.

The Chairman: That would go to the question of fixing the rate.

Mr. Bruce Thomas: I should have thought so.

Mr. Ogilvie then withdrew.

GAS FINANCES IN BIRMINGHAM.

Price of Gas Increased.

The report of the Gas Committee referred to on pp. 588 and 589 of last week's "Journal" came before the Birmingham City Council on Tuesday, the 7th inst., and was, with two amendments, accepted.

Alderman Lloyd, moving the increase in the price of gas, said that, in addition to greatly enhanced costs, the Committee had to face the reconstruction of the Nechells works. The inclined retorts at Nechells, installed in 1900, were quite beyond repair; and the Committee had to choose between reconstructing on the old, out-of-date lines, or demolishing them, and substituting an up-to-date carbonizing system. The policy of the Committee had been for years past, before commencing upon the large capital expenditure involved in the construction of new gas-works, for which they had the land at Washwood Heath ready, to modernize their existing works as far as possible, in order to take advantage of the very efficient systems of carbonizing which had of late years been introduced. It was only by adopting this policy that they had been able to stave-off the construction of the new gas-works on the Washwood Heath site, acquired by the Council in 1911. The output of gas rendered it imperative that the modernization of the Nechells plant should be tackled at once. Unfortunately, owing to the greatly enhanced cost of materials and labour, they had to spend over £500,000 on plant which, prior to the war, could have been installed for somewhere about £150,000. It was estimated that, when the plant was completed and at work, the saving that would be effected in decreased labour costs and the more efficient carbonization would enable the Committee gradually to liquidate the amount. Until the plant was at work, however, to carry out the undertaking to the Finance Committee, the charge on revenue account would amount to an extra £60,000 a year. Altogether the increased charges on the department, imposed since the last revision of gas prices, amounted to no less than £300,000; and after deducting an estimated increased revenue from residuals—a doubtful quantity—the Committee were

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faced with a net extra cost of approximately £150,000 per annum. Comparisons were frequently drawn between the price of gas in Birmingham and towns in the North. He pointed out, however, that, owing to Government control, the Committee were unable to obtain the coal they needed from the districts from which they used to secure it, and were forced to receive very large quantities (amounting at times to as many as fifteen train loads of 400 tons each per week) from Durham, at an increased delivery cost of about 10s. per ton, and an increased carbonizing cost, in addition—owing to the unsuitability of the coal for their plant—of at least another 10s. per ton. On top of this, the Midland gas undertakings had been refused permission to export their coke.

The resolution was carried.

Alderman LLOYD then moved the adoption of the report.

Mr. SIWARD JAMES proposed the following addendum, which was accepted: "That this Council asks the Gas Committee to communicate to the proper Government quarter a representation of its surprise at hearing of the effects of coal control and of the purchase of unsuitable coal effected at remote places such as Durham, and presses for the early abolition of control, thereby freeing access to our natural supplies."

Alderman Sir WILLIAM BOWATER complained that the Gas Committee had not taken the slightest notice of the advice tendered by the Finance Committee as to the financial effects of some of their proposals.

Alderman BOWER moved: "That the Gas Committee be requested to consider and report to the Council on the possibility of an arrangement being made whereby users of prepayment gas-meters will become owners of their fittings after a fair and reasonable amount of time and the necessary payment has been made."

Mr. MARKS asked if the contract price of the Woodall-Duckham Company for carbonizing plant at Nechells was conditional on the results attained being above or below a certain standard, or was the condition that it should vary with the rise or fall of wages?

Alderman CLAYTON asked if there was any reasonable explanation why the Gas Committees had to take Durham coal (which did not suit them) at an excessive price, when before the war they drew supplies from coalfields much nearer Birmingham.

Alderman LLOYD accepted Mr. James's amendment, stipulating, however, for a little freedom in its interpretation. Answering Mr. Ward and Alderman Clayton as to coal supplies, he said Durham coal happened to be a commodity of which there was a surplus. The coal they wanted was Derbyshire and South Yorkshire coal; and unfortunately the Coal Controller sent that to London to be used for household coal. Birmingham was suffering because it happened to be a large centre, which could take very big supplies; and the transport authorities had found it during the war—and apparently still found it—convenient to compel Birmingham to take large supplies from the Durham coalfield to facilitate transport arrangements. Referring to another matter, he pointed out that the pensioning-off of men over fifty at the retorts was not a provision coming under the superannuation scheme. It was a business arrangement proposed by a business department for the purpose of efficiency. The Chief Engineer estimated that it would effect a saving of from £50 to £60 a week. Instead of spending more money, they expected to save £3000 a year. He apologized to Alderman Bower that the Committee had been unable to do anything so far in the matter of fittings. They had a mass of figures prepared by their late Accountant, but had not seen their way to produce anything definite. The present time was particularly inappropriate for anything to be done, because the Government had brought in a measure which would institute the sale of gas by therms instead of cubic feet. The whole matter would be in the melting-pot during the next few years. As to the present financial position of the undertaking, and the question of reserves from which works of reconstruction could be financed, he pointed out that if the price of gas had been maintained at a slightly higher level in days past they might have accumulated a fund. It was one of the things he had been striving for. But previous Town Clerks always held that the Committee were precluded from making such accumulations under the Consolidation Act. Coventry had now got a clause which gave them freedom in this respect; and he hoped that when next the Birmingham Corporation went to Parliament, the Town Clerk would be able to get something for them on similar lines.

Alderman Bower's amendment was defeated on a show of hands; but on names being taken, it was carried by 68 votes to 31—one member remaining neutral.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 13.

The London market for tar products continues quiet; but there is no particular alteration in values to record. Makers' idea of price for pitch is not below 225s. per ton net f.o.b. works. Creosote is steady at about 1s. 4d. per gallon net and naked. Pure benzole and pure toluol are firm from 4s. 3d. to 4s. 6d. per gallon. Solvent naphtha (95-160) is about 3s. 6d. per gallon. There is practically no demand for pyridine bases; the price being called 18s. per gallon nominal.

In sulphate of ammonia, the position remains unchanged.

Tar Products in the Provinces.

Dec. 13.

The average values for gas-works' products during the week were: Gas-works coal tar, 120s. to 125s. Pitch (all pitch prices are purely nominal) East Coast, 175s. to 180s. per ton f.a.s.; West Coast—Manchester, 175s. to 180s.; Liverpool, 175s. to 180s.; Clyde, 180s. to 185s. Benzole 90 p.ct. North, 3s. 1d. to 3s. 2d.; crude 65 p.ct. at 120° C., 2s. 3d. to 2s. 5d. naked at makers' works; 50-90 p.ct.

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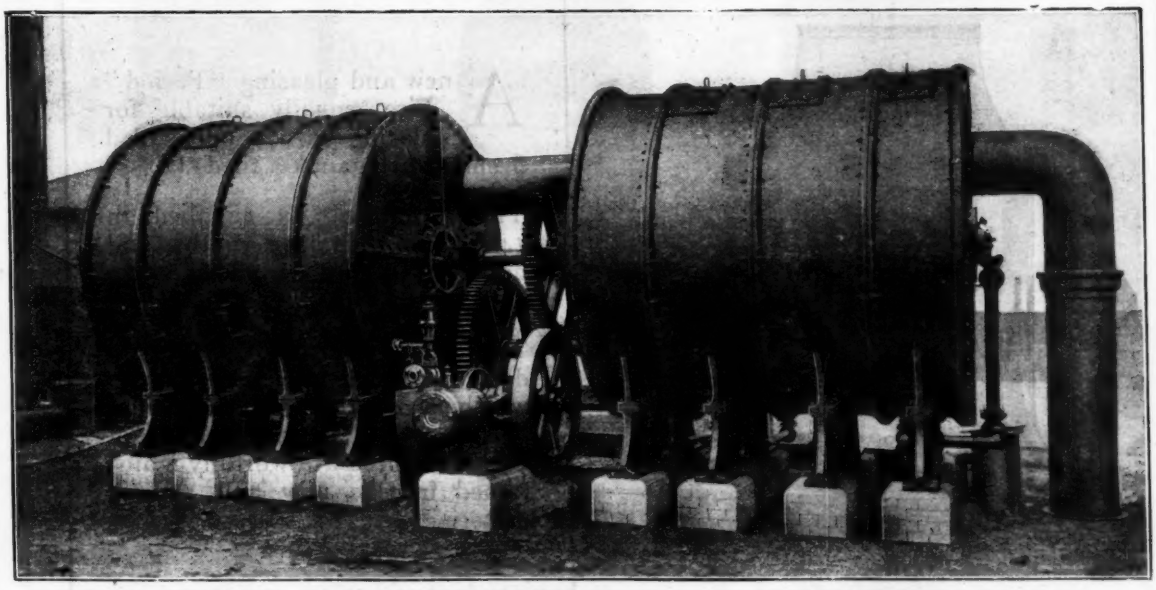

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naked, North, 3s. 2d. to 3s. 3d. Toluol, naked, North, 3s. 1½d. to 3s. 2½d. nominal. Coal tar crude naphtha in bulk, North, 1s. 2d. to 1s. 3d. Solvent naphtha, naked, North, 3s. to 3s. 2d. Heavy naphtha, North, 3s. 1d. to 3s. 3d. Creosote, in bulk, North, liquid, 1s.0¾d. to 1s. 1¾d.; salty, 1s. to 1s. 1d. Heavy oils, in bulk, North, 1s. 1d. to 1s. 2d. Carbolic acid, 60 p.ct., 2s. 7½d. to 2s. 9d. Naphthalene, £37 10s. to £40; salts, £10 to £10 10s., bags included. Anthracene, "A" quality, 1s. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

This market has become thoroughly disorganized, not so much with regard to prices, but more with reference to buying. Everyone seems to have the same idea—namely, that he can very well afford to wait, as prices are almost certain to fall. The result is that only small orders for immediate use are being executed. This state of affairs is almost unprecedented in the history of the trade, as at this time of the year it is the custom to make large contracts over the first half of the coming year; but nothing of the kind appears to be taking place at present. Pitch is neglected, though nominally lower. The new proposed Association has not yet been formed, but, as anticipated last week, it can only be met by a selling association. Benzoles are without change, although the demand shows no signs of growing less. The only other firm spot in the market is creosote, the price of which is maintained by the continued effect of dear fuel and dearer labour. Solvent naphtha may be considered the next most active product, and is in rather better demand than at last report. Naphthalenes, however, are more difficult to sell; the refined attracting very little attention at the greatly reduced quotation of about £35 per ton. Crudes, however, do not fall very much, and makers of fire-lighters are rather disappointed. In intermediate products, the position is quiet, and values are inclined to fall away.

The range of quotations is as follows:

Benzole: 90% London 4s. 1d., North 3s. 10d. to 3s. 11d.; 50-90% 3s. 6d. London, 3s. 3d. to 3s. 4d. North; crude 60-65%, 2s. 5d. to 2s. 7d.; pure, 4s. 3d. per gallon naked.

Crude Tar: London, 105s. to 115s.; Midlands, 107s. 6d. to 117s. 6d.; North, 105s. to 115s. per ton *ex* works. Refined tar, 95s. per barrel (free) on rail.

Pitch: London, 200s. to 210s. per ton f.o.b.; East Coast, 200s. to 210s. per ton f.o.b.; West Coast, 195s. to 200s. f.a.s., with Manchester 200s. per ton, and Glasgow 195s. per ton; South Wales, 210s. per ton.

Solvent Naphtha: London, 3s. 2d.; Provinces average 3s. per gallon.

Crude Naphtha: Naked, 1s. 1d. to 1s. 2d.; North, 1s. per gallon.

Heavy Naphtha: 3s. 3d. per gallon.

Naphthalene: Refined flake, £35 per ton nominal; inferior, £30 crude, £14 to £20 per ton, according to quality.

Toluol: Naked, 3s. 4d. per gallon nominal; North, 3s. 2d.; pure, 4s.

Creosote: London, 1s. 3d. to 1s. 4½d.; North, 1s. 3½d.; heavy oil, 11½d. per gallon in bulk.

Anthracene: 40-45%, 1s. 4d. to 1s. 6d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Pyridine: 20s. to 25s. per gallon.

Aniline Oil: 1s. 8d. per lb., drums extra.

Aniline Salts: 1s. 10d. per lb.

Cresylic Acid: Crude, 3s. 9d.; 95%, 4s. to 4s. 6d.; 97-99% 4s. 3d. to 4s. 9d.; pure 5s. 6d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 2s. 6d. per gallon; crystals 40%, 8d. per lb. nominal.

Salicylic Acid: Technical, 2s. 3d.; B.P., 2s. 10d. per lb.

Xylol: Pure, 5s. 3d.; commercial, 4s. 6d. per gallon.

Resorcin: 12s. to 13s. per lb.

Alizarine 20%: 2s. per lb.

B. Naphthol: 3s. per lb.

Sulphate of Ammonia.

There is a very fair demand for home consumption at £26 per ton for delivery this month. Considerable orders are being booked for delivery during February and March. Manufacturers have practically cleared the surplus of orders which accumulated during the coal strike, and are now laying themselves out to cater for that demand. Export business is in the neighbourhood of £30 per ton, and with the resumption of international competition in nitrogenous fertilizers, it is probable that quotations, both for home and foreign consumption, will have to come down after next year.

In America, it is reported that there are considerable quantities on hand at various ports; but, at the same time, these are judged to be on re-sale.

Quality of the Teignmouth Gas Supply.—The question of the gas supply of Teignmouth came up for special consideration at a meeting on Tuesday last week of Teignmouth Urban District Council, when a motion was submitted by Mr. Foster that the manager of a private gas undertaking of repute should be obtained, with a view to taking the necessary steps towards improving the quality of the gas. The motion was opposed by members, who pointed out that improvements were being completed by the manager at the works which would make things quite satisfactory. An appeal was made to the Council by the Chairman to give the manager a fair chance; and the motion was defeated. The Gas Committee had recommended that no further steps be taken in constructing a weighbridge and weigh office at the gas-works; but after discussion the advice was rejected, and the work will proceed.

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Keynsham Gas Company.

The future of the Keynsham Gas Company was lately discussed by a meeting of parishioners, presided over by Mr. C. R. Willoughby, the Chairman of the Parish Council, who explained that the meeting had been called owing to a rumour having been circulated in the town that, owing to the lack of up-to-date plant, the Company might have to close-down. On inquiry, the rumour was confirmed; but it was ascertained that, by the issue of fresh capital, the Company could not only continue to supply present consumers, but could extend their mains to parts of the parish not yet reached. Something probably would already have been done in the way of reconstruction of the works, but the war intervened. The capital was £3500; and if an additional £4000 were raised, the works could be thoroughly reconstructed and the mains extended. With an efficient service, a good profit should result. At present the gas was supplied to 252 houses; and it was not possible to supply more. The mains were laid near 500 other houses, all of which could be supplied if the works were reconstructed. The mains could be carried further to supply 200 houses. There was also a good prospect of reducing the present cost of gas to consumers. Mr. Graham Bush (the Chairman of the Company) stated that an experienced engineer had been consulted. He had reported that "the town and district are quite capable of supporting a thriving gas company with an output and turnover of at least three times the present figures; and there is no reason why this business should not be profitably obtained, to the advantage of the present shareholders." The Company had approached the Bristol Gas Company, with a view to purchase; but the reply was that they regretted they could not do so, neither could they extend their mains so as to supply Keynsham. Bath could not come to Keynsham, as Bristol possessed parliamentary powers to supply the town. A Committee of Investigation was appointed to go into the question with the Directors of the Company, and report to another meeting.

Extensions Foreshadowed at Accrington.—At the annual meeting of the Accrington Gas Board last week, Alderman D. C. Dewhurst was appointed Chairman for the seventeenth year. He stated that in the next few years there would be important developments in the work of the Board. The demand for gas was increasing by leaps and bounds, and the Manager said if the increase continued the Board would seriously have to consider increasing their works at Great Harwood.

Lurgan Gas Undertaking.—At a meeting of the Lurgan Urban Council, Mr. W. Tallentire, the Manager of the gas-works, reported that the closing-down of the works for the renewal of the retorts would extend over a period of four months unless they installed a carburetted hydrogen plant. With this plant, the supply could be maintained; and although the gas might not be of the quality usually sent out, it would be good enough for all manufacturing purposes. The plant, he explained, would cost about £3700, and would always be useful as an auxiliary. It was decided to apply for a loan for the amount stated.

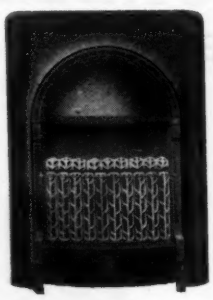
Cawood Gas Company (1917), Ltd.—At an extraordinary meeting held for the purpose, it was resolved that the Company be wound-up voluntarily, and that Mr. Morris Milner be appointed Liquidator.

Danish Gas Company.—The profit of the Company for the year ended June 30 was £8339, and £18,917 was brought forward. After providing for debenture interest, there remains £124 to be carried forward to the next accounts.

Effect of the Coal Strike in Birmingham.—The Birmingham Corporation Gas Committee make reference to the coal strike, the effect of which was to reduce by one-half the small stock of coal held. It will be well-nigh impossible to replace the coal taken from stock before the heavy winter demand has to be met, when large quantities have, under normal conditions, to be taken from the stock in hand, in order to maintain the supply of gas. Every effort will, of course, be made to obviate a breakdown of the supply; but the Committee feel that the public should be informed of the serious position created.

Nelson Gas-Works Accounts.—The accounts of the Borough of Nelson Gas Department for the year to March 31 last show receipts on revenue account amounting to £111,624, and expenditure £91,044, leaving a gross profit of £20,580; the net profit transferred to revenue appropriation account being £3044. With this transfer, the sum on the credit side of the appropriation account amounted to £12,278; and various sums being withdrawn (including £2719 for renewal of vertical retorts and £2230 for purchase of oil production plant), there was a surplus at March 31 reserved for plant renewals of £4403. For the previous twelve months the net profit was £10,467. The quantity of gas sold in the past year was 427,101,800 c.ft., as compared with 355,542,000 c.ft. for the year before.

Developing the Commercial Side in Glasgow.—The "Glasgow Herald" says: It is encouraging to learn, in these days of high prices and soaring rates, that there is a prospect of Glasgow being supplied with better and cheaper gas. In both respects there is room for improvement; and this is believed to be possible by a development of the municipal gas undertaking on its commercial side. It is only within comparatively recent years that the economic potentialities of the bye-products of gas manufacture have been realized. In Glasgow and elsewhere, a brisk traffic has been done by municipalities in disposing of the bye-products; but while a considerable revenue has been derived, the profit accruing to the Corporation was by no means commensurate with the value of the commodities. The Corporation Gas Department of Glasgow is in process of reorganization; and particular attention is being directed to the commercial aspect of the undertaking. The department in future will dispose of the gas bye-products without the intervention, as hitherto, of the "middleman;" and the entire proceeds from sales will flow into the municipal coffers. The revenue is optimistically, and, it is believed, not excessively, estimated to amount to somewhere about £700,000 per annum, which would enable the cost of gas used for lighting purposes to be very appreciably reduced.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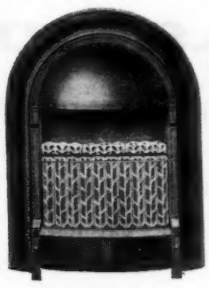
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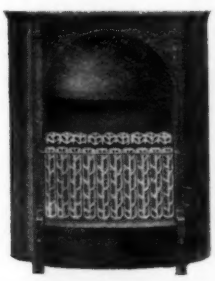
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The "O.K." Series

Have received the highest commendation from Medical Authorities.
Fitted with patent "Injector-Ventilator" and patent "Thermo-X" Firefront.
All working parts of same size Fires are interchangeable for renewals.
Orders should be placed at once to cope with Season's demand.

ARDEN HILL & CO., "Acme" Works, BIRMINGHAM.

A partial breakdown of the electricity supply was experienced at Wolverhampton last Wednesday afternoon.

A slight fire at the Punch Tavern, in Fleet Street, is believed to have been caused by the fusing of an electric wire.

The Enniskillen Urban Council passed a resolution of protest against an increase in the price of gas in the town to 12s. 6d. per 1000 c.ft.

A benzole filling station, for supplying fuel by pump direct to motor-cars, has been installed at Offham Siding, adjoining the main London-Maidstone road at Wrotham Heath.

A partial failure of the electricity supply last Wednesday night caused inconvenience in the central part of Rotherham. Among places affected were the hospital, picture palaces, and shops.

When Walter Height, of Leamington, was fined for the theft of 10s. from the gas-meter at his home, the solicitor, who represented the Gas Company, said this class of offence was getting more frequent.

The Musselburgh Town Council have decided to instal the "A. & M." controllers to the whole of their public gas-lamps, representing a total of 450. The installation is to be fitted up as soon as possible.

The Bradford Corporation Gas Committee have appointed the Chairman, the Deputy-Chairman, and the Engineer and General Manager (Mr. Charles Wood) to represent the undertaking on the National Gas Council, the Federation of Gas Employers, and the British Commercial Gas Association. The Committee have agreed to accede to the application of the National Gas Council for an increase of the annual subscription, and to participate in the British Commercial Gas Association Service Scheme for a year.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Dec. 8.]

Nos. 33,575 to 34,349.

ATTON, J. H.—"Prepayment attachment for gas-meters, &c." No. 34,303.

BOTTOMLEY, W. T.—"Large-scale power production." No. 34,260.

BOTTOMLEY, W. T.—"Production of steam for carbonization plant for large-scale power production." No. 34,261.

BOTTOMLEY, W. T.—"Low-temperature distillation of fuel." No. 34,262.

BRIGHT, M. H.—"Combined lighting and extinguishing adaptor for street lamps." No. 34,344.

BROWN, BOVERI, ET CIE.—"Liquid governors." No. 33,664.

CARPENTER, C.—"Carriers for supporting incandescent gas-mantles." No. 34,132.

CASALE, L.—"Apparatus for catalytic synthesis of ammonia." No. 34,124.

CLAPP, H. B.—"Linings for gas-producers." No. 34,118.

CLEARY, E.—"Manufacture of a combustible gas from liquid fuel." No. 33,645.

CRIGHTON, G. F., and CRIGHTON, LTD., G. F.—"Manufacture of jet-nipples for incandescent gas-burners." No. 33,575.

CRIGHTON, G. F., and CRIGHTON, LTD., G. F.—"Means for carrying globes, shades, &c., of gas-lights." No. 33,576.

FEROLITE, LTD.—See Clapp. No. 34,118.

FONBLANQUE, L. DE.—"Manufacture of gas from carbonaceous materials." No. 33,708.

FONBLANQUE, L. DE.—"Retorts for low-temperature carbonization of carbonaceous materials." No. 33,709.

GOLDSMITH, W.—"Ball-and-socket joints for pipes, &c." No 33,650.

HARTLEY, H.—"Gaseous-fuel heated furnaces." No. 33,905.

HARTLEY, H.—"Gas-burners." No. 33,906.

HOFFMANN, A.—"Check-valves for cocks, &c." No. 34,123.

KENT, W. G.—"Liquid-meters." No. 33,670.

KOPPERS, H.—"Gas-producers." No. 33,674.

KOPPERS, H.—"Regenerative retort-settings." No. 33,675.

KOPPERS, H.—"Coke manufacture." No. 33,346.

LEPRESTRE, R.—See Casale. No. 34,124.

MERZ AND M'LELLAN.—See Bottomley. Nos. 34,260, 34,261, 34,262.

MOELLAR, J.—See Fonblanque. Nos. 33,708, 33,709.

RICHMOND GAS STOVE AND METER COMPANY.—"Gaseous-fuel heated furnaces." No. 33,905.

RICHMOND GAS STOVE AND METER COMPANY.—"Gas-burners." No. 33,906.

SHAW, E. J.—"Incandescent gas-lamps, &c." No. 33,953.

STEWART, J. G.—"Gas-flow regulators." No. 33,890.

STONE, G. S.—"Gas water-heater." No. 33,706.

TECHNO-CHEMICAL LABORATORIES, LTD.—"Preparation of lignite." No. 34,207.

UNION APPARATEBAUGES.—"Determining heat value of gases." No. 34,334.

WEEKS, E. G.—See Bottomley. Nos. 34,260, 34,261, 34,262.

WILSONS' "PERIAL SUNBEAM"

GAS FIRE.

The "PERIAL SUNBEAM" Gas-Fire has been specially designed to fit the coal grates where the extension at the bottom is not removable, and therefore it is not possible to fit the ordinary "SUNBEAM." The "PERIAL" is made in two sizes only.

No. of Stove.	No. of Flames.	Width Within Brick-Sides of Coal Grate.
9	9	For 13 inches opening
10	10	For 15 inches opening

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STOCK MARKET REPORT.

THE Stock Exchange was not cleared last week of the disquieting elements which have been troubling it for weeks past. The opening was cheerful and courageous, and markets really seemed to be picking up some little strength. But before long there came a renewed outbreak of selling, both home and continental, and hopes were rudely dashed. The week closed with a feeling of uncertainty which enjoined prudent abstention from commitments.

The gilt-edged market escaped without suffering very material damage. In Home Government issues, Victory was the only one of the big four much affected. Friday's prices were as follows: Consols 43¾-44¼, War Loan 82¹⁵⁄₁₆-83⅛, Funding 66-66½, Victory 72⅞-73⅛. Bonds were fairly steady, and Corporation met with support. Home Rail prior charges were firm. Canadians were fairly firm; but Argentines were irregular.

The Foreign Market opened steady, but failed to maintain as the week progressed. Greek and Russian were flat; and French, Mexican, and Japanese rather lower. Chinese were steady.

In the Miscellaneous Market movements were mostly adverse. Rubber was quite out of favour, and Oil was down; but the latest prices were above the worst.

Business in the Gas Market was of about equal weight with that of the previous week; but a more than usually small number of the minor companies were included, and the three big companies divided the bulk of it. The predominant tendency was firm. In the London Companies, South Metropolitan rose 1, and Gas Light and Commercial were steady. In Suburbans, South Suburban debenture rose 2; but Ilford "B" had a sharp fall. In the Continentals, Imperial was very firm, and made a further moderate advance, and the quotation rose 3. European was steady and unchanged. Primitiva was only dealt in once.

Bargains done for cash during the week were as follows: On Monday, Commercial 4 p.ct. 54, Gas Light ordinary 52½, 53, 53⅛, 53⅜, Ilford "B" 58, Imperial Continental 143, 143½, 144, 144½, 144⅝, 145, 145½, 146, ditto debenture 94, Primitiva preference 20s. 6d., South Metropolitan 58½, 59, 60, South Suburban 56½. On Tuesday, Brentford "B" 47½, British 21, Commercial 3½ p.ct. 49, European 6½, Gas Light ordinary 53, 53⅜, ditto maximum 38⅜, Imperial Continental 144, 145, 145⅛, 145⅜, 145⅝, 145⅞, 146, 146½, Eastbourne 5 p.ct. "A" 64, ditto 3½ p.ct. "B" 50, Hartlepool 5 p.ct. 68½. On Wednesday, Gas Light ordinary 53, 54, ditto maximum 37⅜, Imperial Continental 144½, 145½, 146, 146¼, 146½, 147, 147½, ditto debenture 94, River Plate debenture 37, South Metropolitan 59, 60, 60⅛, Wandsworth, Wimbledon 46, 46½. On Thursday, Cape Town preference 5½, Commercial debenture 43, Gas Light ordinary 53, 54, ditto maximum 38⅜, Imperial Continental 145½, 146, 146⅜, 147, 147½, ditto debenture 94½, 94⅝, South Metropolitan 59½, 60, 60⅛, 60⅜, Tottenham "B" 51, 51½. On Friday, Alliance and Dublin 40, Brighton and Hove original 110, European 6, Gas Light ordinary 53¼, 53½, 53⅝, 54, ditto maximum 38, 38⅜, 38½, Imperial Continental 145, 145½, 146, 146¼, 146½, 146⅝, 147, ditto debenture 94¼, 94⅜, South Metropolitan 60, 60⅛.

In the Money Market, the approaching close of the year was heralded by the commencement of the normal demands of the season, and rates stiffened accordingly, but not to an immoderate degree. Discount rates hardened sympathetically. Silver had a great fall to 38⅝d. The Bank rate is 7 p.ct., fixed on April 17 last.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Aug. 27	4	4%	Aldershot 4 p.c. Pref.	...	56—61	...
1,551,868	,,	Oct. 14	2½	3⅛%	Alliance & Dublin Ord.	59—64	38—43	40
374,000	,,	July 14	4	4%	Do. 4 p.c. Deb.	76—79	47—52	...
280,000	5	Oct. 28	7½	8%	Bombay, Ltd.	5½—6½	4½—4¾	...
100,000	5	Aug. 12	16	5%	Bournemouth Gas and Water: 5 p.c.	..	8—9	...
383,110	10	,,	7	7%	Bournemouth Gas and Water: B 7 p.c.	15—15½	8½—9½	...
115,000	10	,,	6	6/-	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	7½—8½	...
162,065	—	June 25	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	...	62—64	...
992,045	Stk.	July 14	14	30/-	Brentford A Consolid.	261—266	50—55	...
734,920	,,	,,	11	26/3	Do. B New	204—209	47—52	47½
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	68—73	...
221,400	,,	June 10	4	4%	Do. 4 p.c. Deb.	91—93	60—63	...
214,775	,,	Aug. 27	11	7½%	Brighton & Hove Orig.	208—213	110—120	110
244,200	,,	,,	8	5⅛%	Do. A Ord. Stk.	154—159	73—83	...
1,287,500	Stk.	July 29	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	Sept. 15	12½	10%	British	44—45	20—22	21
120,000	Stk.	June 25	4	4%	Do. 4 p.c. Deb. Stk.	88—90	57—59	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	39—42	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1½—2½	7—7½	..
100,000	10	Dec. 10	—	4½%	Do. 4½ p.c. Pref.	4—6	5—6*	5½
100,000	Stk.	June 25	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	56—61	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,280	,,	Aug. 12	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	54—59	54
560,000	,,	,,	5½	26/3	Do. 3½ p.c. do.	103—105	47—52	49
475,000	,,	June 10	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	43—46	43
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	25—30	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—50	...
51,600	,,	Aug. 27	14½	10½%	Croydon A 10 p.c.	...	125—135	...
278,400	—	,,	11½	7½%	Croydon B and C 7 p.c.	..	90—100	...
492,270	Stk.	—	6	5%	Derby Con. Stk.	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	6—7	6—6½
16,298,975	Stk.	July 29	4/17/4	30/-	Gas Light and Coke: 4 p.c. Ord.	98—102	51—54	52½—54
2,600,000	,,	,,	3½	26/3	Gas Light and Coke: 3½ p.c. max.	76—79	36—39	37½—38½
4,062,235	,,	,,	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	55—58	...
4,674,850	,,	June 25	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	45—48	...
130,000	,,	Dec. 11	10	10%	Gas Light and Coke: 10 p.c. Bonds.	...	...	...
82,500	,,	Sept. 15	5	3⅛%	Hastings & St. L. 5 p.c.	...	53—58	...
258,740	,,	,,	3½	2⅜%	Do. 3½ p.c.	87—89	37—39	...
70,000	10	May 13	11	8%	Hongkong & China, Ltd.	16½—16¾	8½—9½	...
86,600	Stk.	Sept. 15	9	5⅝%	Hornsey 7 p.c.	...	87—89	...
131,000	,,	Aug. 12	7½	4⅝%	Ilford A and C	151—154	79—84	...
65,780	,,	,,	6½	3⅛%	Do. B	115—118	57—62	58
65,500	,,	June 25	4	4%	Do. 4 p.c. Deb.	92—94	55—58	...
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	145—150	143—147½
1,235,000	,,	Aug. 12	3½	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	92—97	94—94½
235,242	,,	Sept. 15	6½	5%	Lea Bridge Ord. 5 p.c.	119—121	80—85	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.: A.	211—213	...	...
					Liverpool 5 p.c. Ord.: B.	146—148	...	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Aug. 12	7/5/6	3⅛%	Maidstone 5 p.c.	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4½—4¾	1¾—2¼	...
250,000	100	Oct. 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	86—93	...
541,920	Stk.	Nov. 26	4	6%	Monte Video, Ltd.	11½—12	68—73	...
1,875,892	,,	July 29	4½	3⅛%	Newcastle & Gatsh'dCon.	98½—99½	60—61	...
529,705	,,	June 25	3½	3⅛%	Do. 3½ p.c. Deb.	82—83	50—51	...
15,000	10	Sept. 15	—	8%	North Middlesex 10 p.c.	...	12½—13½	...
55,940	10	,,	7/14/0	5⅛%	,, ,, 7 p.c.	14—15	7—7½	...
300,000	Stk.	Nov. 26	8	8%	Oriental, Ltd.	117—122	96—99	...
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	...
60,000	50	Aug. 27	13	7½%	Portsea Island, B	128—131	65—70	...
100,000	50	,,	12	6½%	Do. C	118—121	50—55	...
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	⅞—1	...
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4½—5	½—1½	20/6
521,600	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91—93	67—69	...
600,000	Stk.	July 29	4	4%	Do. ,, ,, 1911	...	40—42	...
346,198	,,	June 25	4	4%	River Plate 4 p.c. Deb.	85—87	37—42	37
150,000	10	Sept. 30	6	6/-	San Paulo: 6 p.c. Pref.	10½—11	6½—7½	...
125,000	50	July 2	5	5%	San Paulo: 5 p.c. Deb.	47—49	38—40	...
135,000	Stk.	Aug. 27	10	5%	Sheffield A	223—224	60—63	...
209,984	,,	,,	10	4%	Do. B	222—224	57—59	...
523,500	,,	,,	10	3⅛%	Do. C	220—222	56—58	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	Sept. 30	9	9%	South African	10½—11½	10½—11½	...
6,609,895	Stk.	Aug. 12	5/4/0	30/-	South Met. Ord.	111—113	58—61	58½—60½
250,000	,,	July 14	—	5%	Do. Red. Pref.	...	91—93	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	45—48	...
224,820	,,	Aug. 27	8½	3%	South Shields Con. Stk.	157—159	95—96	...
1,087,795	,,	July 29	6	3⅛%	S'th Suburb'n Ord. 5 p.c.	114—116	56—61	56½
247,558	,,	June 25	5	5%	Do. 5 p.c. Deb. Stk.	116—118	67—72	...
647,740	,,	Nov. 12	7½	3⅛%	Southampton Ord.	99—102	55—58	...
121,275	,,	June 25	4	4%	Do. 4 p.c. Deb. Stk.	...	59—61	...
120,000	,,	Aug. 12	—	3⅛%	Tottenham: A 5 p.c.	135—138	60—65	...
782,275	,,	,,	6	2⅜%	Tottenham: B 3½ p.c.	115—117	50—55	51—51½
181,255	,,	June 10	4	4%	District: 4 p.c. Deb.	87—89	57—60	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Sept. 15	5	3⅛%	Tynemouth 5 p.c. max.	108½—109	69—71	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Aug. 27	8½	47/6	Wandsworth A 5 p.c.	151—156	75—80	...
255,636	,,	,,	6½	32/6	Do. B 3½ p.c.	129—134	53—58	...
108,075	,,	,,	—	33/3	Do. C	...	50—55	...
140,865	,,	,,	—	33/3	New Ordinary	...	50—55	...
332,000	,,	,,	6½	26/3	Wimbledon 5 p.c.	117—122	43—48	46—46½
98,000	,,	,,	6½	32/6	Epsom 5 p.c.	121—126	50—55	...
88,416	,,	June 25	3	3%	3 p.c. Deb. Stk.	66—69	44—47	...

* Ex Div.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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GAINSBOROUGH URBAN DISTRICT COUNCIL.
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TENDERS FOR AMMONIACAL LIQUOR.

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The Ammoniacal Liquor will be Delivered into Contractor's Tank Barrels at the works.
Sealed Tenders, endorsed "Tender for Ammoniacal Liquor," addressed to the Chairman of the Gas Committee, must be Delivered at the Gas-Works, Gainsborough, not later than 18th of December, 1920.
The Committee do not bind themselves to accept the highest or any Tender.
JOHN BALDWIN,
Engineer and Manager.

Gas-Works, Gainsborough,
Dec. 8, 1920.